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MINUTES OF PROCEEDINGS

OF THE

ROYAL ARTILLERY INSTITUTION.

VOLUME XXIV.

WOOLWICH:
PRINTED AT THE ROYAL ARTILLERY INSTITUTION.
And Published by Messrs. DULAU & Co., 37, Soho Square, W

1897.

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JAN 20 1897
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REPORT

ON THE

MANŒUVRES OF THE XIV. GERMAN ARMY CORPS IN BADEN, SEPTEMBER 1896.

BY

COLONEL A. E. TURNER, C.B., A.-A.-G., R.A.

Note.—In details of troops set out in this paper:—

Battalion	= 1 Battalion of Infantry.
Squad.	= 1 Squadron Cavalry.
Abt. F.	= 1 Brigade Division Field Artillery.
Abt. H.	= 1 ,, ,, Horse ,,
Battery F.	= 1 Battery Field ,,
Battery H.	= 1 ,, Horse ,,
Co. Inf.	= Company of Infantry.
Co. P.	= ,, ,, Pioneers.
Dn. Tel.	= Section of Telegraph Battalion.

These manœuvres took place upon the rivers Neckar and Tauber and intervening country, and concluded with three days Corps Manœuvres in the vicinity of Mosbach.

The corps is composed almost entirely of Baden troops, as far as the men are concerned, its head-quarters are at Karlsruhe. It is commanded by General von Bülow, who was General Staff Officer to Prince Frederick Charles, with whom he was present at most of the principal battles in 1866–70–71, including Königgratz, Vionville, Gravelotte, St. Privat, &c. He bears a very high reputation as a leader of men. He was Military Attaché at Paris both before and after the latter war. The chief of his staff is Colonel Baron von Vietinghof, who was aide-de-camp to the late Emperor Frederick, and who is also esteemed as a very able and accomplished staff officer.

The corps is composed of the 28th and 29th Infantry Divisions, the 4th, 8th, 10th, 14th Battalions of Jägers, the 28th and 29th Cavalry Brigades, the 14th and 30th Regiments of Field Artillery. Besides the above, the corps has two Pontoon Trains, four companies of Pioneers and two Hospital Detachments, &c.

The 28th Division is commanded by General von Grone and has its

head-quarters at Karlsruhe; the 29th Division is under the command of Prince Frederick Wilhelm, Hereditary Grand Duke of Baden, who with his very able General Staff Officer, Major von Lindenan, will surely come most prominently to the front in case of war. The head-quarters of this division are at Freiburg, and portion of it is stationed at Mülhausen, on the frontier, but a short distance from Belfort. With the sanction of Lord Wolseley and by special permission of His Majesty the Emperor of Germany, I attended the Divisional Manœuvres of the 29th Division and the Corps Manœuvres; in the first instance being attached to the staff of the Hereditary Grand Duke of Baden, in the second to that of General von Bülow.

In spite of the very bad weather the manœuvres were so interesting and instructive that I venture to give "in extenso" the general and special ideas and the orders issued day by day; I append a map.

Head-quarters 29th Division,
Zwingenberg, 9th October, 1896.

"General idea for the 10th September. A Western Army has crossed the Rhine at Maxau and Germersheim. An Eastern Army is concentrating between the Neckar and the Tauber, their main strength being at Buchen and Adelsheim.

Special Idea for the Western Force.

The left wing of the Western Army has on the 9th September pushed its advanced guard to Meckesheim and an advanced flank detachment to Wiesenbach, while its main body has gone into bivouacs on the left bank of the Elsenz. The following orders are given by the General Commanding for the 10th :—

Wiesloch, 9th September, 8 a.m.

1.—The advanced troops of the enemy are reported to be on the Neckar from Eberbach to Gundelsheim in considerable strength.
2.—The advance of the corps on the Neckar will be continued to-morrow.
3.—The advance guard will march off to-morrow at 8 a.m. and proceed by Epfenbach to Reichartshausen; the cavalry will reconnoitre up to the valley of the Neckar between Gundelsheim and Zwingenberg.
4.—The left flank detachment will march by Waldwimmersbach on Reichartshausen, and will so arrange its time of starting and rate of march that it will meet the advanced guard at the latter place. The cavalry will reconnoitre along the Neckar from Zwingenberg to Eberbach, and will break up the railway there, to do which the detachments detailed for the purpose must swim the Neckar.
5.—The main body will follow the advanced guard at a distance of 1½ kilometres.
6.—Route of heavy baggage.
7.—Route of Ammunition Columns.
8.—I shall march at the head of the main body.

Distribution of the troops :—

Advanced guard—Commander Major-General Kuhlmay.

6 battalions, 2 squads., 1 Abt. F., 1 Co. P., 1 Din. Tel.

Flank detachment—Commander Colonel Blieding.

4 battalions, 2 squads., 1 Abt., F.

The head of the main body will be marked by men of the 112th Regiment with red flags."

(Signed) General Commanding.

Rendezvous for the 10th September.

For the advanced guard in and about Meckesheim with the head at the exit from this place in the direction of Epfenbach. For the flank detachment in and about Wiesenbach with the head at the eastern exit from the village.

Entry into the theatre of operations.

"At 8 a.m. patrols can be sent forward from Neckargemünd, Wiesenbach and Meckesheim ; all boats have been removed on the Neckar from Heidelberg to Gundelsheim, the bridge at Neckargemünd has been destroyed, but the folding-boats (Faltbooten) of the Dragoons are available for crossing the river.

(Signed) Friedrich, Erbgrossherzog von Baden."

Special Idea for the Eastern Force.

The Army Corps on the right wing of the Eastern army, which has concentrated at Buchen on the 9th September, has sent in advance detachments to cover its concentration ; these are in positions on the right bank of the Neckar as follows :—

(*a.*) At Eberbach, under the command of Colonel Taubert, 2 battalions, 2 squads.

(*b.*) At Zwingenberg, under the command of Major-General von Braunschweig, 4 battalions, 2 squads., 2 batteries F.

(*c.*) At Diedesheim, 2 battalions, 1 squad., 1 battery F.

The detachment at Eberbach has destroyed the bridge at Neckargemünd ; that at Diedesheim has prepared the railway-bridge at Neckarelz for destruction and the bridge of boats at Diedesheim for removal. All ferry and other boats have been brought over to the right bank and concealed. Patrols of cavalry which have crossed the river report the advance of the enemy from the Rhine, and have ascertained that strong detachments of his forces, which have compelled our cavalry to retire, have reached the Elsenz, and occupied in the evening Meckesheim and presumedly Wiesenbach.

At 10 p.m. on the 9th the following telegram is received at Zwingenberg from the General commanding the corps :—

Head-quarters, Buchen,
9th September, 8 p.m.

To Major-General von Braunschweig.

"The concentration of the Army Corps is completed ; general advance to take place. The 2nd company of Pioneers with divisional Pontoon Train will join you to-night, and a bridge is to be thrown

over the river at Zwingenberg, which is to be completed at latest by 6 a.m. to-morrow.

All the advanced detachments are placed under your command, and are by their concentration, not only to cover the passage of the troops in rear over this bridge, but are to enable them to effect their concentration on the high ground west of the Wartschaft Brook in the general line, Michelbach-Helmstadt."

(Signed) General Commanding.

Rendezvous for the 10th September.

(*a.*) Detachment at Eberbach, in and about that place.

(*b.*) Detachment at Zwingenberg in column of march on the road from Zwingenberg to Unterdielbach, with the head at the bridge thrown across the river.

(*c.*) Detachment at Diedesheim, in and about the village, the head at the bridge of boats.

Entry into the theatre of operations on the 10th September.

(*a.*) For the Eberbach detachment 6.30 a.m. For crossing the river the "folding boats" of the Dragoons are available, as also a number of country boats, which the company of Pioneers will collect during the night.[1]

(*b.*) For the Zwingenberg Detachment—6.30 a.m. for patrols, 8.30 a.m. for the rest of the troops.

(*c.*) For the Diedesheim Detachment—6.30 a.m. for patrols, 8.30 a.m. for the remainder.

(*d.*) For the Pioneers and Bridge Train 2 a.m.

(*e.*) No. 1 Brigade Division Field Artillery is apportioned to the troops in rear, and has a special task to carry out.

(Signed) Friedrich Erbgrossherzog von Baden.

The following orders were issued by the respective commanders for the 10th September :—

Western Force, Detachment Orders.

1.—Orders for the advanced guard.

Meckesheim, 9th September, 10 p.m.

The advanced troops of the enemy stand on the right bank of the Neckar from Eberbach to Gundelsheim, his patrols have been pushed up to the Elsenz.

The Army Corps will continue its march on the Neckar to-morrow. The left flank detachment will march from Wiesenbach by Waldwimmersbach on Reichartshausen.

[1] The "Faltbooten," or folding boats, are constructed in three sections, which are bolted together when required for use. The boat consists of a frame-work covered with thick sail cloth and made waterproof. A platform and light superstructure are carried with the boats, two of which can be joined together to bear the platform, which on an emergency will convey, I was told, six dragoons and their horses. A wagon with six horses is attached to each cavalry regiment, and carries two of these boats and the platform.

1.—The cavalry will march at 8.30 a.m. from its place of rendezvous at Meckesheim and will proceed to Reichartshausen by Epfenbach by the southern road, it will reconnoitre as far as the Neckar between Gundelsheim and Zwingenberg and keep up communication with the flank detachment.

2.—The advanced party of the advanced guard will move off at 8.30 a.m. and march by the northern road from Meckesheim by Epfenbach on Reichartshausen. The main body (of the advanced guard), which will pick up the outposts on the way, will follow at a distance of 500 yards.

3.—Parking of heavy baggage.

4.—I shall march with the advanced troops.

(Signed) Kuhlmay.

Additional order—

The cavalry will send out three officer's patrols at 6.30 a.m. The officers to report themselves to me for orders at 11 p.m. to-night.

Order of March.

Distribution of the troops—

Advanced guard—Cavalry, 3 squads., less 1 Field Troop.
Troop Cavalry, 1 Co. P.

Vanguard—Commander Major Wunsch, 1 Battalion, 1 Field Troop.

Main body advanced guard—3½ Battalions, 1 officer and 8 men Cavalry, wagons of Abt. F., and 1 Dn. Tel.

2.—Left Flank Detachment.

Detachment Orders, Wiesenbach, 9th Sept., 10 p.m.

1.—Advanced parties of the enemy stand on the right bank of the Neckar from Gundelsheim to Eberbach.

2.—The Army Corps will advance at 8.30 a.m. to-morrow, the advanced guard will proceed from Meckesheim by Epfenbach on Reichartshausen.

The left flank detachment will proceed by Waldwimmersbach to Reichartshausen.

3.—The advanced guard (of the flank detachment) will move off from the eastern exit of Wiesenbach and march by Waldwimmersbach on Reichartshausen.

At 6.30 a.m. it will send cavalry patrols to the Neckar from Zwingenberg to Neckargemünd, and a strong patrol, under an officer, to break up the line of railway from Eberbach towards Darmstadt—a wagon with "folding boats" will accompany it for the purpose of enabling it to cross the Neckar. Communication will be kept up with the advanced guard, to whom constant reports will be sent.

4.—The main body of the detachment will follow the advanced guard at a distance of 600 yards.

5.—Heavy baggage.

6.—I shall be with the main body of the detachment.

(Signed) Blieding.

Distribution of the troops:—

Advanced guard—Commander, Major Ludwig, 1 Battalion, 2 Squads, less 1 section.

Main body—3 Battalions, 1 Abt. F.

Orders given to the three detachments.

EASTERN FORCE.

No. 1.—Zwingenberg Detachment,

Zwingenberg, 9. 9. 96., 10.30 p.m.

1.—Meckesheim and probably Wiesenbach have been occupied by the enemy in strength this evening.

2.—The Army Corps which has concentrated at Buchen will assume the offensive to-morrow morning.

3.—The advanced troops have been placed under my command, and I intend to concentrate on the general direction of Michelbach and so patrol the crossing of the Neckar by the troops marching in rear at Diedesheim and Zwingenberg.

4.—The Eberbach detachment will cross the Neckar at 6.30 a.m. by means of the "folding boats" of the cavalry and other vessels, and will march by Schwanheim on Michelbach, reconnoitring towards Wiesenbach and Neckargemünd.

5.—The Zwingenberg detachment will cross the Neckar at 8.30 a.m. by the bridge thrown over by the Pioneers, and will march by Neunkirchen on Unterschwarzach, reconnoitring towards Wiesenbach-Meckesheim-Zuzenhausen.

6.—The Diedesheim detachment will march at 8.30 a.m. by Obrigheim on Aglasterhausen, reconnoitring to its front and in the direction of Waibstadt.

7.—Officer's patrols will be despatched from all three detachments in the directions indicated at 6.30 a.m. During the advance close communication will be kept up between the three columns.

8.—Heavy baggage.

9.—I shall march with the Zwingenberg detachment at the head of the infantry of the main body.

Oberst von Bonin and Oberstlieutenant Taubert are directed by telegram to communicate the orders given by them up to 5 a.m. to-morrow; the latter to inform me as to the number of boats at his disposal at Eberbach and the probable time that will be occupied by his detachment in crossing the Neckar.

(Signed) Von Braunschweig.

No. 2 detachment,

Eberbach 10. 9. 96., 6 a.m.

1.—Meckesheim and probably Wiesenbach are occupied by the enemy in strength.

2.—The detachment will commence to cross the Neckar at 6.30 a.m. and will march by Schwanheim on Michelbach. Advanced guard—1 company of Jägers. Distance to the main body 400 metres.

3.—The cavalry will cross the river in the "folding boats," first No. 5 then No. 3 squadron. The Jäger battalion followed by the 1st battalion 114th Regiment will cross in country boats.

4.—No. 5 squadron will trot by Pleutersbach and Unter Schönbrunn to the elevation marked 280, south of Waldwimmersbach and reconnoitre in the direction of Neckargemünd and Wiesenbach by means of officer's patrols. For the purpose of securing and reconnoitring on the flank, Unter-offizier's posts will be established successively as the column advances, as follows :—

(*a*) At Pleutersbach; to be withdrawn at 10 a.m. and rejoin its squadron by Waldwimmersbach and Schwanheim.

(*b*) Height east of Unter Schönbrunn.

(*c*) Height south of Oberhang.

5.—No. 3 squadron, after crossing, will march by Neckarwimmersbach-Schwanheim-Michelbach-Lerchenberg to height 280 and there unite with No. 3 squadron.

6.—The Jäger battalion will detach two bicyclists to the Dragoons at Waldwimmersbach. The 1st battalion 114th Regiment will leave two bicyclists in Schwanheim. The 3rd Squadron Dragoons will leave an Unter-offizier's post at the latter place as "relay" and for flank protection for Michelbach.

7.—I shall march with the advanced guard of Jägers.

(Signed) Taubert, Oberstlieutenant.

No. 3 Detachment,
Diedesheim, 9. 9. 96, 10 p.m.

1.—Meckesheim and probably Wiesenbach are strongly occupied by the enemy.

2.—The advanced troops of the Eastern Corps will cross the Neckar to-morrow at Eberbach, Zwingenberg and Diedesheim and will unite during their advance.

3.—The Diedesheim detachment will march at 8.30 a.m. and proceed by Obrigheim to Aglasterhausen.

4.—The advanced guard will reconnoitre to the front and left flank and will keep in touch with the Zwingenberg detachment, which will march at 8.30 on Unter Schwarzach by Neunkirchen. Officer's patrols will be sent in the direction of Waibstadt.

5.—The heavy baggage will remain temporarily at Diedesheim.

6.—I shall march with the infantry of the advanced guard.

Distribution of troops:—

Advanced guard—Commander Major Regenaur, ¾ of a Squad., ½ Battalion.

Main body—Distance 500 metres.
Remainder of 1/113th Regiment, 1½ Battalions, 1 Battery F.

(Signed) Von. Bonin.

By 2 a.m. the Pioneers with the Pontoon Train were hard at work bridging the Neckar at Zwingenberg, the current was very strong, and the breadth of the river about 60 yards. Soon after 5 o'clock it was ready for the passage of all arms; and having regard to the fact that the work was all done in the dark, and that none of the Pioneers except the Unter-offiziers had as much as two years' service, the performance must be looked upon as a highly creditable one.

Shortly before 6 a.m. I left Zwingenberg with Major von Lindenan and Major von Schwerin, a direct descendant of Frederick the Great's celebrated old Marshal, and proceeded to Eberbach, about 8 miles off to see the crossing of the river by the right detachment of the force. There is no bridge here and two battalions and two squadrons had to be conveyed over as quickly as possible, for although their start was to take place two hours before that of the detachments at Zwingenberg and Diedesheim, and not only had a bridgeless river to be crossed without any bridging materials, but they had a march of over twelve kilometres to the place of concentration at Michelbach, while those at the latter places had bridges available and about three kilometres less distance to perform.

A number of country boats, some of them large barges, had been procured, and the two "folding boats" of the Dragoons were ready. The horses, about 300 in number, were stripped, a dragoon rode one and led another, the men's legs being bare; about 30 horses at a time entered the water and, with very few exceptions, crossed quietly enough; by 7.15 a.m. all were over. I asked if the men could swim, but was told that nothing was known as to this; for the period of the men's service was much too short, and too much had to be done in it to teach them to swim. No one can doubt as to the truth of this statement. Down stream, a few yards below the place of crossing, ropes were stretched across the stream as a succour to any soldier who parted company with his horse. No man however did this. In the meantime the rest of the Dragoons, their saddlery, arms and appointments were being rapidly conveyed across in the two regimental and other boats; and further down the infantry, the Jäger battalion lead-

ing, were crossing in country boats. I then returned to Zwingenberg to march with the central column. I was told that the whole operation from the start, at 6.30 a.m., to the time when the whole of the force was over and ready to march off was an hour and a half.

The cavalry on both sides were soon far to the front, one officer's patrol of the Western Force managed to elude all those of the enemy and came upon the head of the central column from Zwingenberg, on which it galloped back and gave exact information as to where the enemy's main column was at a certain hour. The concentration of the Western Force was completed and a strong position taken up on the Lerchenberg, the three batteries of the right column coming into action on this hill, those of the left on some high ground 200 yards to the north. In the meantime the left and centre columns of the Eastern Force had between Aglasterhausen and Unter Schwarzach, and on the enemy's opening fire the three batteries were brought into action in front of the latter place. The artillery duel then took place at 2700 yards; the preponderance of artillery of the Western Force, six batteries against three, soon led the umpires to decide that the latter was overcome, and then came a general advance of the former's infantry, who gained the road from Michelbach to Helmstadt, by a front and right flank attack and drove the enemy back in the direction of Ober Schwarzach, the artillery taking up a second position half left to their former one. The Eastern artillery had now been reinforced by three batteries of the main body, but it was too late to save the day, and General von Braunschweig retreated on Neunkirchen, where his troops went into bivouacs, with an outpost line in front of Unter Schwarzach. The Western Force went into bivouacs about Reichartshausen, with outposts running from the cross roads west of Aglasterhausen across the Lerchenberg to Waldwimmersbach. The night was very wet.

During the battle Major von Brunschweig received the following order at Neunkirchen at 11.30 a.m. from Army Head-quarters:—

"The enemy has been strongly reinforced on his right flank from the direction of Sinnsheim and threatens to turn our left. The intention therefore of the Commander-in-Chief to hold the heights east of the Warterschaft-Bach in the general line, Michelbach-Helmstadt is abandoned, and the movement for that purpose is to be stopped. The Eastern Corps will take up a position about Neunkirchen in conjunction with the XIII. Corps (imaginary) which has crossed the Neckar to-day and which is marching by Bargen and Ingelsheimerhof. You will take up a suitable position about Neunkirchen with all the troops at your disposal to cover the deployment of the Eastern Corps (imaginary), the greater part of which will not be across the Neckar at Gundelsheim before to-morrow morning.

The 1st Abtheilung F. Arty. Regt. 30 is placed under your orders and will reach you about 11.30 a.m."

(Signed) Commander-in-Chief,
Eastern Army.

At 2.30 p.m., after the conclusion of the battle, Major-General

Kuhlmay commanding the Western Force received the following order from his Commander-in-Chief at Epfenbach :—

"The enemy's force which has advanced from Gundelsheim by Wollenberg has halted at Bargen, and appears to be about to bivouac there and at Ingelheimerhof. The West Corps (imaginary) has occupied Helmstadt and has gone into bivouacs; his main body being across the Helmstadt-Epfenbach road, west of the Warterschaft-Bach; Head-quarters at Epfenbach; the Aglasterhausen-Diedesheim road will be reconnoitred by the West Corps, leaving you to watch towards the Neckar from Eberbach to Zwingenberg. To-morrow morning I intend, in conjunction with the XV. Army Corps (imaginary) which has reached Neckarbischofsheim to attack the enemy at Ingelheimerhof and Bargen. Simultaneously with this attack you will advance from your bivouacs at 7 a.m., attack the portion of the enemy's forces which have been driven back to-day on Neunkirchen and drive him across the Neckar."

(Signed) General Commanding,
Western Army.

At 7 a.m. on the 11th the Western Force advanced from their rendezvous in front of Reichartshausen upon Neunkirchen, where the enemy were in a strong position with his artillery, now reinforced to six batteries, in front of the village. The artillery of the former was brought into action in front of some woods west of Aglasterhausen, and at about 2700 yds. the artillery duel commenced: the number of guns were equal on both sides, which makes the situation very difficult for the umpires to decide as to which side has the preponderance. The infantry advanced, the main strength being with the right wing. When the infantry of the first line had advanced well beyond the guns, and when the second line reached them they limbered up and came into action about 1700 yards from the enemy's guns; in this advance, before the fire of the enemy's artillery had been kept under, it was decided that they would have lost heavily. The left wing of the infantry advanced to about 800 yards and poured in a heavy fire to occupy the attention of the defender, while the right worked round to turn his left through the woods east of Unter Schwarzach; the commander of the Eastern Force had been kept well informed of this movement by his cavalry, and as the columns of the Western Force emerged from the woods and the ground between them, he delivered a counter attack in great strength by means of masses of troops which he had drawn under cover to his left. The cavalry of the Western Force then charged to delay this attack, but they were met by that of the Eastern Force, whose charge, coupled with the fire of infantry, was decided to have driven them off the field. The attack of the Western Force was decided to have failed. There can be no doubt but that the decision was correct, as the two forces were practically equal, and the artillery of the Eastern Force was in a very well selected position and equal in numbers to that of the attack. The great advantage that the defence possesses over the attack, when the numbers and quality of the

troops are equal, was well illustrated, especially where the commander of the latter is resolute and delivers a counter attack, well prepared and veiled, upon the enemy, who has had a long march under fire.

In consequence of the failure of the attack on Neunkirchen and retirement of the Western Force, the following orders were issued :—

SPECIAL IDEA FOR THE EASTERN FORCE.

After the Force under General von Braunschweig had repelled the attack of the Western Force at Neunkirchen and followed the enemy who retired, partly on Helmstadt, partly on Epfenbach, as far as Aglasterhausen, the following orders were issued by the General Commanding the Corps :—

"The Army Corps is in bivouacs at Unter and Ober Schwarzach and Neunkirchen. The advanced guard under the command of Colonel Graf von Hardenberg, consisting of the 57th Infantry Brigade, the 8th Battalion of Jägers, the 14th Dragoons, the 1st and 3rd Abtheilungs Field Artillery Regiment 30, the 2nd Company Pioneers, the Divisional Bridge Train and No. 1 Hospital Detachment will bivouac about Aglasterhausen and will occupy the high ground immediately to the south-west of that place, in case of an attack by the enemy. Michelbach will be occupied by a battalion from the main body. The roads leading to Helmstadt, Bargen and Epfenbach are to be reconnoitred."

(Signed) General Commanding,
Eastern Corps.

In consequence of these orders, the following were issued by the commander of the Eastern Force :—

Unter Schwarzach,
11th Sept., 6.30 p.m.

1.—Helmstadt is strongly occupied by the enemy and Epfenbach also, but in less strength; reinforcements for him have arrived this afternoon by rail at Hoffenheim and Zuzenhausen, the line having been repaired, and are marching on Waibstadt.

2.—I shall attack the enemy again to-morrow.

3.—The advanced guard will advance from their bivouacs at 7 a.m. to-morrow, 12th Sept., attack the enemy at Helmstadt and Epfenbach and drive him over the Elsenz.

4.—The main body will march at 7.15 a.m. from Unter Schwarzach by Aglasterhausen on Helmstadt.

5.—I shall be at the head of the main body.

6.—The heavy baggage will remain temporarily at Unter Schwarzach.

(Signed) General Commanding,
Eastern Force.

SPECIAL IDEA FOR THE WESTERN FORCE.

After the attack of the Western Force upon Neunkirchen had been

repelled, the following order was received by its commander, Major-General Bock von Wülfingen, from the Commander-in-Chief :—

Biegelsberg, N.W. of Bargen,
11th Sept., 9.45 a.m.

The combined attack of the XV. Army Corps and the main body of the Western Corps upon the enemy at Ingelheimer-Hof and Bargen, has so far succeeded that both places have been taken. In face, however, of the arrival of constant reinforcements to the enemy, the attack has been checked, and the corps must retire behind the Wollen-Bach. The Western Corps retires by Flinsbach on the Stiefel-Berg. It will in any case be able to hold the positions taken this morning till the 58th Infantry Brigade (Western Force) has effected its retirement and established itself on the Helmstadt-Waibstadt road. The latter will cover the left flank of the Army Corps and the assembly of the troops, who will arrive this afternoon by rail at Waibstadt and it will send a strong detachment to Epfenbach to cover the arrival of reinforcements at Neidenstein and Eschelbronn railway stations. Further reinforcements will arrive to-day at noon and later at Zuzenhausen, Hoffenheim and Sinnsheim, so that when they are all assembled I shall be in a position to resume the offensive with greatly superior forces.

(Signed) General Commanding
Western Army.

The Epfenbach detachment will be under the command of Oberst-lieutenant Brinckmann, 22nd Dragoons, and will consist of :—

4th Battalion Jägers.

Unter offizier, school, Ettlingen.

1st, 3rd and 4th Squadron 22nd Dragoons.

The main detachment, under Major-General Bock von Wülfingen, will be composed of :—

7 Battalions, 2 Squads., 2 Abt. F., 4 Co. P., 1 Dn. Tel.

The Western Force was very strongly posted on the Sackberg, the six batteries being behind the wood on the north side and the infantry behind both this and the wood on the south side, the cavalry was scouting well in front, and directly the enemy began its advance, the guns came into positions which had been prepared between the two woods, one marked 237 on the left and the other just north of the Helmstadt-Waibstadt road. A strong advanced post of infantry was pushed about 200 yards in front of the northern wood to the left front of the line of guns, the remainder being concealed. As the enemy advanced, the Dragoons retired by the right flank and halted in rear of the southern wood. The ground fell to the north-east to a deep broad valley, which could be swept by fire in every direction ; a frontal attack appeared impossible ; still this and this only was attempted and supported by the fire of six batteries on the Weilerhof height, marked "236," 3,000 yards from the position of the Western Artillery. Rain fell incessantly and in torrents and this led to a curtailing of the artillery

duel. The lines of the Western Infantry began to descend the long slopes on their side and then the detachment at Epfenbach advanced and deployed across the road leading from that place to Helmstadt and brought a heavy flanking fire at 800 yards upon the enemy's right flank, while battalion after battalion of the main detachment deployed and fired upon the Western Infantry, whose defeat must have been complete. The weather was so bad and the ground so deep that the operations were cut short, and "cease fire" sounded before a counter attack, which must have annihilated the infantry of the attack, was made. It was evident, from the first, that a frontal attack on such a position as that occupied by the Western Force was an impossibility with anything like equal forces, and it is difficult to see why the commander of the Eastern Force did not work round the right flank of his enemy and threaten his line of retreat, by occupying the heights south-west of Helmstadt with his guns and bringing his infantry up under cover of the woods, south of the Helmstadt-Waibstadt road, which would take General von Bocks' strong position in flank and rendered it untenable. This ended the three days' campaign, and the troops all went into quarters in the numerous surrounding villages for Sunday, Sept. 13th, which was fortunately fine, the only day without rain during the latter part of the manœuvres.

On the night of the 13th, the orders were issued for the Corps Manœuvres, and on the 14th, the whole of the cavalry, with the 29th Division, was united and marched on the Neckar a day in advance of the Division, to cover the advance of the latter; no guns accompanied this Cavalry Brigade.

In the meantime orders were issued for an engagement between the 57th and 58th Infantry Brigades, for the 14th Sept., on which day the Grand Duke of Baden and General von Bülow were present.

The general idea was as follows:—

A Northern Corps is situated on the line Eschelbronn-Neidenstein-Waibstadt on the heights north of the Schwarzbach on the 14th Sept., and from 6 a.m. is engaged with a Southern Corps.

The forces are equal.

Reinforcements are expected by both sides, by the Northern Corps from Zwingenberg, by the Southern from Hilsbach.

Special Idea for the North.

The left wing of the Northern Corps, marked by blue flags, is across the Waibstadt-Helmstadt road, 500 yards east of the former place. The Brigade von Bose coming from Helmstadt passes the western side of the Waschauf wood and marches on the Sackberg. At 7.15 a.m. its head reaches the southern side of the wood north of the hill, and is on the path which traverses the wood.

The following order is received by Oberst von Bose, from the General Commanding the Northern Corps:—

Kuhnberg, 14. 9. 96., 7 a.m.
Received 7.15 a.m.

You will march with your brigade to support in échelon the left

wing of the corps and act as reserve to it. In case of the enemy attacking my left flank, you will reinforce it and prevent its being turned.

(Signed) General Commanding the Corps.

Entry into the theatre of operations 7.15 a.m.

Troops composing the Brigade von Bose :—

7 Battalions, 2 Squads., 1 Abt. F., 2 Co. P.

N.B.—The left wing of the Northern Force is marked with blue, that of the Southern Force with red flags.

Special Idea for the South.

The Brigade Bock von Wülfingen is on the march from Hilsbach to Obergimpern. The sound of an ever increasing cannonade is heard in the direction of Waibstadt, the brigade marches in its direction from Steinsperth.

On the arrival of the head of the brigade at the south of Rohrbach, the following information is received by its commander :—

1.—Officers patrol, 5th Squadron, 22nd Dragoons.

Height north of Oberbiegelhof, 14 .9., 5.15 a.m.

"No enemy seen in the direction of Obergimpern."

(Signed) S., Lieutenant.

2.—Officers patrol, 4th Squadron, 22nd Dragoons.

Waibstadt, 14. 9., 6.5 a.m.

On the right flank of the Southern Corps Waibstadt is strongly held by infantry, north of that place, the right flank battalion is across the road Waibstadt-Epfenbach, and its firing line is over the railway. The left wing of the enemy appears to have extended very little east of the road Waibstadt-Epfenbach.

(Signed) W., Premier Lieutenant.

The right flank of the Southern Corps is marked with red flags.
Entry into the theatre of operations 6.15 a.m.

Troops Southern Force :—

9½ Battalions, 2 Squads., 2 Abt., F., 4 Co. P., 1 Dn. Tel.

(Signed) Friedrich Erbgrossherzog von Baden.

The following orders were issued by the commanders of the two opposing forces :—

NORTH.

South side of the wood lying north of the
Sackberg, on the country track,
Waschauf, Waibstadt,
14. 9. 96., 7.15 a.m.

Brigade Order :—

1.—The Northern Corps occupies the north bank of the Schwarzbach and is engaged with the enemy, result undecided.

Its left wing is now about 500 metres east of the Epfenbach-Waibstadt road. The enemy is expecting reinforcements from Hilsbach.

2.—The brigade will first act as reserve to the Army Corps, and will deploy in rear of the left wing and in échelon to it.

3.—The cavalry will reconnoitre the roads leading through Helmstadt and Neckarbischofsheim to Hilsbach, and will keep the country between Neckarbischofsheim and Flinsbach continually under observation by means of patrols.

4.—Infantry Regiment, No. 113, less the 3rd Battalion, will deploy in the hollow, north-east of the Sackberg.

5.—No. 3 Abtheilung Field Artillery Regiment No. 30, with an additional battery, will advance to the Sackberg, and come into position behind the crest.

6.—Infantry Regiment, No. 114 and 2nd Co. Pioneers will wheel to the east at the cross roads, marked 237 in the map, and proceed to the south-east corner of the wood, where they will be formed up.

7.—I shall proceed to the Sackberg.

Order of march.

Advanced guard—Oberstlieutenant von Lölhöffel
3 Battalions, 2 Squadrons.

Main body—5 battalions, 1 Abt., F., and 1 Battery F., 1 Co. P.

(Signed) Von Bose, Oberstlieut. and Brigadier.

The above communicated verbally to the assembled commanding officers.

SOUTH.

Southern exit from Rohrbach,
14. 9. 96., 6.45 a.m.

1.—The Southern Corps is seriously engaged with the enemy and is on the line Eschelbronn-Neidenstein-Waibstadt, and is in undisputed possession of Waibstadt, no enemy has been discovered in the direction of Obergimpern.

2.—The Brigade will march on Waibstadt and operate against the left wing of the enemy.

3.—The cavalry of the advanced guard will be independent (selbstständige Cavalerie) and will reconnoitre in the direction of Neckarbischofsheim, and hold fast the left wing of the enemy.

4.—The advanced guard will march from Rohrbach by Grösserwald on Waibstadt.

5.—The main body will follow at a distance of 600 metres.

6.—The heavy baggage.

7.—I shall ride at the head of the main body of the advanced guard.

Distribution of troops :—

1.—Independent Cavalry—Major von Nathusius, 22nd Dragoons, 1½ Squads.

2.—Advanced guard—Oberstlieutenant Dieckmann, 3 Battalions, ½ Squadron, less 10 Troopers, 1 Co. P.

3.—Main body—8 Battalions, 10 Troopers, 2 Abt. F., 1 Dn. Tel.

(Signed) Bock von Wülfingen,
General-Major.

The above communicated verbally.

The following message was despatched at 6.45 a.m. to the officer commanding the troops in Waibstadt :—

The Brigade marches at once from Rohrbach on Waibstadt, with the object of taking part in the battle in which the South Corps is engaged.

I shall endeavour to bridge the Schwarzbach so far as required by me.

(Signed) Bock von Wülfingen,
General-Major.

It will be seen that the Southern Force had 5 batteries, 2 squadrons, 11 battalions, and the Northern 4 batteries, 2 squadrons and 8 battalions, and that the operations represented a portion of a battle in which a whole Army Corps was engaged on both sides ; and, further, that the stronger force was on the move against a smaller one which was stationary.

The action was commenced by the artillery of the Northern Force, who opened fire upon the Southern Column as it debouched from the Grösser Wald ; the artillery of the latter was hurried up to reply, came into action on the high ground above Waibstadt, the range being a little over 3,000 metres ; neither artillery advanced, as any forward movement would have brought them down into the broad deep hollow and a second position was impracticable. The position of the Southern Artillery had this great disadvantage, that owing to the dense woods on its right, running to within two to three hundred yards of the Schwarzbach, the left of the enemy was not visible. The latter made very good use of this circumstance by massing the great proportion of his force out of the range of artillery fire, on his extreme left, and under cover of the wood north of the Sackberg ; holding the front only with his artillery and two battalions. In the meantime the infantry of the Southern Force, under cover of their superior artillery, crept down to Waibstadt ; two bridges were thrown over the narrow but deep Schwarzbach, the infantry crossed, deployed and advanced across the Helmstadt road and the railway and began to mount the heights, when a counter attack in great force was made by the North, who advanced from the left under cover of the wood, south of the

Sackberg, changed direction to the right and took the advancing lines of the South in flank; at the same time the cavalry of the North charged down on that of the South, which was protecting the right flank of its infantry. The counter attack was very well planned and carried out, but it was itself taken in flank by two battalions of the Southern Force, who had not crossed the railway and who poured in a terrific fire, the men being under cover of the railway embankment. The umpires decided that the counter attack had failed; that it had been delivered too late, not in fact till the South had crossed the Schwarzbach and had time to deploy his whole force, and further that it could not have advanced against the right flank of the Southern Infantry, exposed as it was to the fire of the battalions lining the railway.

With this the Divisional Manœuvres of the 29th Division terminated, and the two opposing Brigades were united, under the Crown Prince of Baden, to operate against the 28th Division in the Corps Manœuvres.

I was then transferred from the staff of His Royal Highness, to which I had been attached, to that of General von Bülow, the Corps Commander, to whom I reported myself at Mosbach the same afternoon.

CORPS MANŒUVRES.

The orders for the Corps Manœuvres were dated:—

Karlsruhe, 12. 9. 96.

General Idea.

An Eastern Army, operating in its own country, has been driven back across the Rhine between Maniz and Worms.

A Western Army is advancing by Speyer and Germersheim.

Reinforcements are assembling for the Eastern Army at Würzburg.

Special Idea for the East.

The Eastern Corps which has come by rail by Würzburg to reinforce and support the left wing of the Eastern Army, has begun to detrain its troops on Sept. 13th at Boxberg, Königshofen and Lauda railway stations. The 28th Cavalry Brigade has assembled on the evening of the 13th Sept., at Osterbürken. The commander of the 28th Infantry Brigade receives the same evening the following telegram at Würzburg from the Commander-in-Chief.

To the 28th Infantry Division, Würzburg.

The 28th Cavalry Brigade, supported by the two Jäger Battalions, will secure the bridges over the Neckar at Neckarelz. My intention is to detrain the Army Corps at Adelsheim and Osterbürken. The 28th Infantry Division will cover this operation. The leading portions of the 29th will arrive early on Sept. 16th.

(Signed) General Commanding.

The 28th Cavalry Brigade accordingly advances to the Neckar on the 14th Sept. On the same evening the advanced guard of the 28th Infantry Division reaches Berolzheim and the main body goes into close quarters (*Eng quartiere)* on the line Boxberg-Unter Enbigheim, and throws out an outpost line.

(Signed) Von Bülow.

The 28th Cavalry Brigade marches from Osterbürken at 8.30 a.m. on the 14th, and the 23th Infantry Division from Berolzheim at 8 a.m. on the 15th Sept.

The Jäger battalions, 10th and 14th, will be forwarded by rail on the 15th (to the Neckar to support the cavalry).

Ordre de Bataille.

28th Infantry Division.
56th Infantry Brigade, 55th Infantry Brigade.

Combined Cavalry Regiment.
6 Squads.

Field Arty. Regt., No. 14.
Oberstlieut. von Sanden.
2 Abt. F.
Bridge Train, 1 Dn. Tel., 3 Cos. P., Hospital Detachment.

28th Cavalry Brigade.
General - Major von Rabe.
8 Squads., 2 Batteries H.

Imaginary :—

1 and 2 Infantry Ammunition Columns.

1 and 2 Artillery Ammunition Columns, Trains, etc.

WEST.

SPECIAL IDEA.

The movements of the Western Army Corps are as follows :—

On the 13th Sept. the 29th Cavalry Brigade reaches Helmstadt, the 29th Infantry Division, Oestringen, the 30th Infantry Division, Hockenheim, and the Corps Artillery, Mingolsheim.

The following orders are issued by the General Commanding :—

Hockenheim, 13. 9. 96., 10 p.m.

1.—The left wing of the enemy's army is between Worms and Heppenheim. Bodies of the enemy are assembling at Würzburg.

2.—The Western Corps will continue its advance to-morrow.

3.—The 29th Infantry Division, to which the 29th Cavalry Brigade and Corps Artillery will be attached, will advance on Würzburg to disperse the enemy's troops, which are assembling there.

4.—The 30th Infantry Division will cover the crossing of the Rhine by the army and for this purpose will advance on the line Worms-Heppenheim.

5.—The 29th Division will be formed in *Ordre de Bataille.*

6.—The General commanding will proceed with the 30th Infantry Division.

(Signed) General Commanding,
Western Corps.

In accordance with the above, the 29th Cavalry Brigade is pushed forward to cover the Neckar on the 14th Sept. On the same day the advanced guard of the 29th Infantry Division marches to Aglasterhausen, the main body to Helmstadt and adjoining country, the Corps Artillery to Waibstadt.

These places are reached by midday by forced marches. No information had up to then been received from the cavalry. The 29th Cavalry Brigade will march at 7.45 a.m., Sept. 14th, from Helmstadt, under orders of the commander of the 29th Infantry Division. The march of the latter and of the Corps Artillery will be so arranged on the 15th Sept. that the infantry do not pass the line Aglasterhausen-Wollenberg before 8.30 a.m.

(Signed) Von Bülow.

WEST.

Ordre de Bataille.

16½ Battalions.
4 Squads., 2 Abt. F., Bridge Train, 2 Cos. P.

29th Cavalry Brigade.
Oberst Graf von Hardenberg.
3 Squads. 22nd Dragoons, 3 Squads. 14th Dragoons.

Corps Artillery.
Oberstlieutenant Leser.
2 Abt. F.

Ammunition Columns—(Imaginary).
6th and 5th (Artillery.) 4th and 3rd (Infantry.)
Trains (imaginary.)

The following additional orders were issued by General von Bülow :—

Head-quarters 14th Army Corps,
Karlsruhe, 12th Sept., 96.

(Tagesbefehl) Order of the day.
For the 28th Cavalry Brigade on 14th Sept.

1.—The Brigade will go into close quarters (*Eng quartiere*) on the 14th Sept. under warlike conditions.

2.—Wagons, with provisions, will be at its disposition from 12 o'clock midday on the ground at Neckarelz, occupied by the magazines.

3.—The dispositions for the bringing up the heavy baggage and provisions will be made by the officer commanding the Brigade.

(Signed) Von Bülow.

(Tagesbefehl) Order of the day.

For the 29th Cavalry Brigade for the 14th Sept.

1.—The Brigade will go into close quarters under warlike conditions on Sept. 14th.

2.—The wagons, with provisions, will proceed under command of an officer of the Brigade from the magazines at Neckarelz to the north side of Obrigheim, where they will park and be at the disposition of the Brigade.

3.—The officer commanding the Brigade will be responsible for bringing up the baggage and provisions.

(Signed) Von Bülow.

Head-quarters, 15th Army Corps,
Karlsruhe, 12th Sept., 96.

EASTERN FORCE.

Order of the day for the 15th Sept.

1.—The accommodation of the troops will be in close quarters and bivouacs on 15th Sept. under warlike conditions.

2.—The wagons, with provisions and necessaries for bivouacs, will be at the disposition of the division at the magazines, Adelsheim, from 8 a.m.

3.—The officer commanding the division will be responsible for all further orders regarding the bringing up the baggage and provision wagons.

(Signed) Von Bülow.

WESTERN FORCE.

Order of the day for the 15th Sept.

1.—The accommodation of the troops will be in close quarters and bivouacs on the 15th Sept. under warlike conditions.

2.—The wagons, with provisions and necessaries for the bivouacs, will be at the disposition of the division at the magazines, Neckarelz, from 8 a.m.

3.—The officer commanding the division will be responsible for all further orders regarding the bringing up the baggage and provision wagons.

(Signed) Von Bülow.

Head-quarters, 14th Army Corps,
Karlsruhe, 12th Sept., 96.

Order of the day for the 16th Sept.

1.—*Re* baggage of troops proceeding by rail.

2.—*Re* baggage of troops proceeding by route march.

3.—*Re* railway station guards.

4.—At the conclusion of the manœuvres, precedence is to be given everywhere to the troops detailed for transport duty with the baggage. Commanding officers will issue the necessary orders to ensure this. Troops marching to the railway stations are to be allowed to pass.

5.—At the manœuvres of the 16th Sept. all the bands are to be present.

(Signed) Von Bülow.

In pursuance of the above general and special ideas and corps orders, the following orders were issued on the 13th, 14th and 15th September by the Divisional Generals :—

WEST.—29TH INFANTRY DIVISION.

Div. H.Q., Oestringen, 13. 9. 96., 11.30 p.m.

To the 29th Cavalry Brigade.

The left wing of the enemy's army is established between Worms and Heppenheim. The General commanding intends to advance the 30th Division in his direction in order to cover the crossing of the Rhine by our army.

I shall march with the 29th Infantry Division and also the 29th Cavalry Brigade and Corps Artillery which have been placed under my command on Würzburg, where a portion of the enemy's troops are concentrating. To-morrow morning the main body of the 29th Infantry Division will assemble at Helmstadt, the advanced guard at Aglasterhausen and the Corps Artillery at Waibstadt. The Divisional Head-quarters will be at Neckarbischofsheim to-morrow.

The 29th Cavalry Brigade will act as "Independent Cavalry," and will reconnoitre in the direction of Würzburg.

(Signed) Friedrich Erbgrossherzog von Baden,
General-Lieut., Commanding 29th Division.

EAST.

Telegram. Würzburg, 13. 9. 96., 10 p.m.

To Cavalry Brigade, Osterbürken.

Enemy advancing by Germersheim-Speyer. The Brigade will secure the bridges at Neckarelz; will march early to-morrow morning from Osterbürken and will reconnoitre the roads leading to the Rhine by Waldwimmersbach-Helmstadt-Sinsheim.

The division to-morrow—main body at Boxberg and neighbourhood; advanced guard, Berolzheim; Divisional Head-quarters, Boxberg. Advances on the 15th. Reports to be sent by telegraph.

(Signed) Von Grone.

WEST.

Head-quarters, Neckarbischofsheim,
14th Sept., 96., 6.30 p.m.

Divisional Order for the 15th Sept.

1.—The 29th Cavalry Brigade has been compelled to retire across the Neckar to Obrigheim by the enemy's cavalry and Horse Artillery. Diedesheim and Neckarelz are in the possession of the enemy; the bridges at those places have been made impassable. The enemy's infantry are reported not to have passed the line Altheim-Gogingen-Adelsheim.

2.—The advance will be continued to-morrow and a passage forced across the Neckar.

3.—The "Independent Cavalry" will remain on the Neckar and endeavour to hold Obrigheim. Patrols are to be sent to reconnoitre in the direction of Würzburg.

4.—The right column will rendezvous at Helmstadt and will march at 7.45 a.m. by Bargen on Hochhausen. Pioneer officers will be sent forward to reconnoitre the Neckar from Neckarelz railway bridge, up stream to Neckarzimmern, and ascertain what means can be procured for crossing and for throwing over bridges.

5.—The left column will rendezvous at Aglasterhausen and will march at 8.30 a.m. along the Chaussée to Obrigheim.

6.—I shall march with the left column.

7.—The heavy baggage of the right column will be at Helmstadt by 8.45 a.m., that of the left column by 9.30 a.m., and will park at those places, care being taken to keep the roads clear.

8.—The Ammunition Columns and Field Hospital (8.10) will march through Aglasterhausen to the hill of Mörtelstein, the remainder of the trains will proceed to Helmstadt.

(Signed) Friedrich Erbgrossherzog von Baden,
General-Lieut. und Divisions' Kommandeur.

Distribution of the troops:—

1.—Independent Cavalry.

Oberst Graf von Hardenberg.
29th Cavalry Brigade.

2.—Right Column.

General-Major Bock von Wülfingen.
58th Infantry Brigade.
Cavalry Regiment von Frankenberg, less 5th squadron
14th Dragoons.

Corps Artillery Regiment.
2nd Company Pioneers with Bridge Train, Hospital Detachment No. 3.

3.—Left Column.

General-Major von Braunschweig.

57th Infantry Brigade.
5th Squadron 14th Dragoons.
Field Artillery Regiment, No. 30.
4th Company Pioneers with Div. Telegraph Abtheilung.
Hospital Det. No. 2.

EAST.

Div. Head-quarters,
Boxberg, 14. 9. 96., 8 p.m.

1.—The enemy is advancing by Germersheim and Speyer. A Cavalry Brigade of the enemy has been driven back

by our cavalry through Mosbach over the Neckar to Obrigheim; he has rendered impassable the bridge of boats.

2.—The division will advance to-morrow in the order of march as given below, on the Chaussée through Adelsheim on Neckarelz.

3.—The advanced guard will march off at 8 a.m. from the west side of Berolzheim. It will keep in touch with the Brigade Rabe.

4.—The main body will follow at a distance of 1,500 metres, marching off from its place of rendezvous east of Berolzheim.

5.—The 10th and 14th battalions of Jägers will proceed at 5 a.m. by train from Eubigheim to Mosbach and report thereto to General von Rabe.

6.—*Re* movement of heavy baggage.

7.—Place of assembly for Ammunition Columns.

8.—I shall be with the advanced guard during the march.

(Signed) Von Grone.

Distribution of the troops :—

Advanced guard—General-Major von Hugo.

Combined Cavalry Regiment—4 Battalions, 2 Squads., less 2 Sections, 1 Co. P.

Main body—8 Battalions, 2 Sections of 1 Squad., 2 Abt. F., 1 Co. P., 1 Dn. Bridge Train, 1 Dn. Tel., Hospital Detachment.

W E S T .

Div. Head-quarters, Dallau,
15. 9. 96., 8 p.m.

1. — The enemy in strength, about a division, with numerous artillery, has advanced by Oberschefflenz and his main body has gone into bivouacs in and in the vicinity of Ober and Mettel-Shefflenz. He has thrown out outposts on the line Auerbach-Katzenthal. His cavalry, Horse Artillery and Jägers have been driven back and have joined his main body.

2.—I intend to attack the enemy to-morrow, and shall direct my main attack against his left wing. With this object, the 57th Infantry Brigade will shortly before daybreak (5.45 a.m) occupy the Hoh-Berg and the Hühner-Berg; the preponderance of its strength being on the latter.

3.—The dispositions of the remainder of the force will be as follows :—

(*a*) North-east of Sulzbach, behind the wooded height marked 322, the 58th Infantry Brigade, less the 4th battalion Jägers and the 3rd battalion 112th Regiment.

(*b*) At Billigheim on the road to Katzenthal, near the northern exit from the former place, the 4th Jägers and 3rd battalion 112th Regiment, under the command of Oberstlieutenant Hoffmeister, in column of route.

(*c*) Under the immediate command of Oberst Schubert, the 30th Field Artillery Regiment on the road Mosbach-Shefflenz, the head of the column being advanced as far as the small wood south of the Kettenberg.

(*d*) The Corps Artillery Regiment will be on the road Stockbrunn-Sulzbach, its head being about 2 kilometres short of Sulzbach.

(*e*) Both regiments will be in column of route and will be kept as far as possible out of sight.

(*f*) The 29th Cavalry Brigade will take post on the left flank of the artillery and will send forward one squadron to reconnoitre the road from Dallau to Rittersbach.

(*g*) The two Pioneer Companies, with the exception of the portions of them needed for bridges, will take post on the right flank of the artillery south of the Sulzbach wood, as will also the combined cavalry regiment, Frankenberg, which latter will detach a squadron to the 4th Jägers and the 3rd 112th Regiment, under Oberstlieut. Hoffmeister, who will direct it to reconnoitre the Billigheim-Oberschefflenz road.

4.—I shall be on the Hühnerberg not later than 5.45 a.m., behind the crest of it, staff officers, etc. will come for orders.

(Signed) Friedrich Erbgrossherzog von Baden,
General-Lieutenant und Div. Kommandeur.

EAST.

Divisional orders:—

Div. H. Q., Ober-Shefflenz, 15. 9. 96., 8 p.m.

1.—The enemy in strength, about a division, has crossed the Neckar. The greater portion of his forces are at Mosbach and Neckarelz. His cavalry outposts occupy the line Sulzbach-Dallau. The first portions of the 27th division will detrain to-morrow at Adelsheim and Osterbürken.

2.—The division will cover these arrivals and will take up a position on the plateau south of Auerbach.

3.—The 55th Brigade, with ½ No. 1 Squadron 21st Dragoons, will march from the bivouacs at 5.30 a.m. on the road to Auerbach.

4.—The 56th Brigade, with ½ No. 1 Squadron 21st Dragoons, will march at 5.45 a.m. from their bivouacs through Unter Shefflenz upon the road leading to the Hohberg.

5.—The 10th Jägers will cover the advance of the 55th Brigade

through the Elzthal from the position they occupied as outposts; and the 14th Jägers will join the 55th Brigade. The 5th Squadron 20th Dragoons will advance by the high road to Auerbach and will reconnoitre the road in the Elzthal in the direction Mosbach-Obrigheim.

6.—Field Artillery Regiment No. 14, the order for whose advance for action I shall myself give, will advance with the 55th Brigade in rear of the leading regiment.

7.—The Cavalry Brigade will march from Unter Shefflenz at 5.30. a.m. in the direction of the Birken Berg and will reconnoitre towards Hassmersheim and Neckarelz.

8.—The 3rd Pioneer Co. will throw a bridge over the Shefflenz, between Ober and Mittel Shefflenz; and the 1st Pioneer Co. will throw a bridge over the same between Mittel and Unter Shefflenz. Operations to begin at 6 a.m.

9.—The heavy baggage will move off from the bivouacs under orders of the brigadiers, in time to be parked north of Gr. Eichholzheim on the road to Bodigheim by 5 a.m. A company of the 110th Regiment will act as escort (imaginary).

10.—One infantry and one artillery Ammunition Column and two Field Hospitals will be at the eastern exit of Ober-Shefflenz at 7 a.m. to-morrow.

11.—During the advance I shall be with the advanced guard of the 55th Infantry Brigade.

(Signed) Von Grone.

Distribution of the troops :—

1.—Right column.

[1] General-Major von Hugo II.
55th Infantry Brigade.
10th and 14th battalion Jägers.
5th squadron 20th Dragoons.
½ 1st squadron 21st Dragoons.
Field Artillery Regiment No. 14.

2.—Left column :—

General-Major von Hugo I.
56th Infantry Brigade.
½ 1st squadron 21st Dragoons.

3.—Cavalry Brigade.

General-Major von Rabe.
20th Dragoons, 1st, 2nd, 3rd, 4th squadrons.
21st Dragoons, 2nd, 3rd, 4th, 5th squadrons.
2 Batteries Horse Artillery.

[1] There are two Generals of this name.

It will be seen that the Corps Manœuvres opened on the night of the 13th Sept., with orders from the commanders of both sides to their Cavalry Brigades, to advance one day ahead of the divisions in the following morning. The Western Cavalry being at Helmstadt, the Eastern at Osterbürken. Distance apart about 25 miles. The Western Brigade crossed the Neckar, but near Mosbach was encountered by an equal force of the enemy's cavalry with two Horse Artillery batteries, before which it was forced to retire across the Neckar, the bridges over which at Neckarelz and Diedesheim it rendered impassable. During the night the Cavalry Brigades faced one another on either bank of the Neckar. The Western Brigade in the afternoon collected a number of boats and bridging material for the repair of the bridges next morning, one of which is a permanent bridge of boats, and during the night the Eastern cavalry managed by sending men over in boats to carry off or cast loose all the collected boats and material.

On the morning of the 15th two battalions of Jägers arrived by train early at Mosbach to support their cavalry at Diedesheim and Neckarelz, so that the West Brigade could do nothing but watch their side of the river and await the arrival of their division. The two Horse Artillery batteries on the East side were sent up to a very commanding eminence called the Schreckhof, from which the whole of the road from Aglasterhausen to Obrigheim, from the point at which it debouches from the wooded height above the latter place, was exposed to their fire. About 9 a.m. the head of the left column, Western Force, came into sight at a distance of about 2500 yards from the Schreckhof, the two Horse Artillery batteries which were in a commanding but very exposed position, at once opened fire. The six batteries of the left column of the enemy were hurried up, and were soon decided to have crushed and silenced the two Horse Artillery batteries which were ordered to retire for the day.

The left column then pressed on, occupied Obrigheim, extended right and left in great force, and soon cleared the opposite bank, repaired the bridges and crossed the river. The enemy (East) beat a hasty retreat and retired on their main body, while the Western column, preceded by their cavalry, pushed through Mosbach and went into bivouacs on the high ground about Dallau. In the meantime the right column reached the Neckar at Hochhausen, the river was greatly swollen from the rains, being about 100 yards broad with a very rapid current. The Pioneers, who had gone in advance, had collected a number of boats and the 'folding boats' of the Cavalry Brigade were also there. The work of taking the infantry across was rapidly carried out, but it was long before a bridge could be thrown over, and it was not till six o'clock that the right column arrived at Sulzbach and went into bivouacs; the heights between the river and that place being very steep and the ground very soft and deep from the incessant rain.

The right column had been on the move more than ten hours, and rain had fallen almost all the time. The outpost line of the West extended from the Hoh-Berg, over the Birken Berg to Sulzbach, and

constant patrols were sent watch the road by Billigheim to Katzenthal. The outpost line of the East rested its right on the Elzthal and extended south through Auerbach to Unter-Sheffienz, the road to Katzenthal being watched by patrols.

The two outpost lines were about 1½ miles apart.

On the 16th the commander of the Western Division, whose object was to outflank and turn the enemy's left and drive him north off his line of retreat on Adelsheim and Osterbürken which he was covering, massed his right brigade behind the wood north-east of Sulzbach, and whilst he worked up to outflank the enemy's right under cover of the woods and rolling ground, made a strong demonstration against the right, which was in position on the plateau about Auerbach and across the road south of it. The six batteries of his right column of the West Force came into action on the Hoh-Berg and the six batteries of the Corps Artillery soon prolonged the line of guns to the right and extended to the Hühnerberg. The artillery of the East took up a position in front of Auerbach, and the artillery duel took place at 2000 yards, the two Horse Artillery batteries being at some distance to the left front. The superior number of guns on the West side was soon adjudged to have crippled the Eastern Artillery, who had but eight batteries against twelve, and the infantry on the Hoh-Berg advanced and made a demonstration. The Eastern commander appeared to think that this was the main point of attack, and the great preponderance of his force was on his right to meet it, when suddenly his opponent, who had concealed with great skill his troops, advanced against his enemy's left, delivered his attack with his right brigade against the left, which was very weak.

The Western Force had not only worked round his opponents left, but he had seized a wood which was immediately occupied in great force from the Eastern side of which the enemy's line was enfiladed. The left of the Eastern Force was rolled up, while his right had been unable to make any head against the great battery of 72 guns on the Hoh-Berg and Hühnerberg. There can be no doubt that he would have been effectually thrown off his line of communication and retreat, and that the detraining and assembly of troops at Adelsheim and Osterbürken would have been completely uncovered.

This closed the manœuvres.

Tactics.—The fundamental principles which I observed throughout were as follows:—

In the attack (*a*) reconnoitring by the cavalry, which uncovered the front and moved in rear of a flank when the enemy was found; *(b)* advance of the artillery to combat that of the defence; (*c*) formation of the infantry for attack under cover of the artillery fire; (*d*) a demonstration against one portion of the defender's position, while the mass of the infantry is pushed under cover where possible against a flank; (*e*) the attack, the firing line advances at one pace interval, the support follows at about 200 yards, also at one pace interval, the

reserve about the same distance in rear in any formation. There is little or no firing till the firing line is about 1000 to 800 yards from the enemy, then the supports close up and reinforce the firing line, while the reserve closes up and extends, diminishing its distance. The reinforced line then moves forward very rapidly, seeking no cover, and without rushes to 500 to 300 yards; here the reserves close up, and a heavy and constant fire is poured in. The second line under cover of this draws forward in great depth opposite the point to be assaulted, not in lines of brigades, regiments or battalions, but in irregular lines of companies in close order with wide intervals, and gradually envelopes the enemy's flank. When these reach the first line, or thereabouts, the drums beat and the pipes play, the second line dissolves into swarms and rushes as such in great depth upon the enemy, the first line becoming a support in échelon to the second. The artillery in the meantime has advanced to a decisive range, having subdued the artillery of the defence, and some of the batteries are pushed forward to quite short ranges, viz., 1000 or less yards, to support the assault, give confidence to the infantry and to crown the position when captured, or to form a first rallying point for them in case of their being driven back by counter attack. It is held that if the guns remain at greater distances, friend cannot be distinguished from foe, either when its own infantry are closing with the enemy in his position or when the former is repelled and closely pursued by the latter in his counter attack.

The characteristics of the defence were: (*a*) Artillery fire kept back as long as possible, so as not to unmask the position prematurely; (*b*) bodies of infantry pushed 300 yards or so in front of the line; (*c*) massing of troops behind some portion of it for counter attack. I saw no attempt at entrenchments, which was probably due to the condition of the ground, which was mostly deep mud; every fifth infantry soldier carries a short spade; and two years ago at the manœuvres of the XV. Corps about Wörth, Reichshofen and Weissenburg, great use was made of them. Counter attacks were delivered in swarms as in the case of the assault. Rapidity, great depth opposite the point of assault, and rush in overwhelming numbers are thus the characteristics of the German assault, and preparation in depth for a counter attack on some portion of the assailants line, that of the defence.

A careful study of Part V. of our 'Infantry Drill Book', especially as amended in that of 1896 just issued, will show that with some divergencies in matters of detail, such as the use of machine guns and mounted infantry, which the Germans do not employ, the principles of their tactics are almost precisely the same as ours, especially as to the method of assault (S. 124. 4., and the instructions as to counter attacks, S. 119.)

If I may be allowed to pronounce an opinion on this subject, it is that after many years study of tactics, I know of no work that within a small compass so well sets forth the fundamental principles for fighting under the present conditions of warfare, as this Part V. of our drill-book does. Precise rules can never be established for fighting, for the

conditions of it will never be the same in any two cases; but a careful study of that, which should be done under nominal conditions, is the ground work which will enable a leader to shape his plans and adapt them to any circumstances which may arise. This was the keystone of the German successes in 1870 and they have improved on it ever since.

Supply of ammunition.—The artillery and infantry Ammunition Columns were imaginary, but their supposed position was always stated. Every company of infantry has a two-horse company ammunition wagon, which carries 9000 rounds. None of these were out with their companies. Each infantry soldier carries 150 rounds, weighing 11 lbs. (the total weight he carries is 63 lbs.)

Smokeless powder was used by the artillery only at the Corps Manœuvres, in the others, for economy's sake, black powder was fired.

Uniform.—The new equipment, which included a loose Norfolk jacket and a valise equipment, somewhat like ours, and which was tried two years ago, was pronounced to be a failure, and the same tunic (Waffen-rock) which was introduced about 1849 and the cowskin knapsack are still worn. The officers wear a serge patrol jacket (Litifka) in billets on the line of march or manœuvres, but never in garrison or on parade.

I have had a good many opportunities of seeing portions of the German Army since the year 1880, and I cannot but come to the conclusion that, in spite of the two years period of service, it has steadily improved year after year, and that it is as perfect a machine for war, as ability on the part of leaders, devotion to duty on that of the officers generally, with perfect discipline and docility on the side of the men, has ever produced.

I cannot conclude without bearing testimony to the kindness and cordial reception which I received, not only from every German officer with whom I came into contact, from the General commanding the Army Corps down, but also from the inhabitants in whose houses I was quartered. One and all vied in showing attention to an English officer and a stranger in the land.

Map to illustrate the Manœuvres

of the

XIV. GERMAN ARMY CORPS, 1896.

Scale = $\frac{1}{100000}$

Metres 1000 0 1 2 3 4 5 6 7 8 9 10 Kilometres

Yards 1000 0 2000 4000 6000 8000 10000 Yards

Mile 1 0 1 2 3 4 5 6 Miles

AFRICAN ANIMALS.

BY

P. L. SCLATER, ESQ., F.R.S.,

Secretary Zoological Society of London.

(A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 29th Oct., 1896).

Colonel R. D. E. Lockhart, Colonel-on-the-Staff, in the Chair.

This Lecture was given to a very full audience of ladies and gentlemen and was illustrated by a fine map of Africa, kindly lent for the occasion by the Royal Geographical Society and by a series of tables and pictures, prepared by the lecturer, which clearly showed the various classes of animals as well as different specimens of those classes; on the tables in the centre of the lecture theatre a large collection of heads and horns, the property of the R.A. Institution, helped materially in the work of illustration.

The lecture was thoroughly appreciated by all who heard it; the following is a précis of the remarks of the talented lecturer.

Referring to the testimony of the old writers that Africa is a "land of wonders," the lecturer stated that he hoped to show that, as regards its larger mammals, this is truly the case, for no other part of the world produces such a number and such a variety of them as certain districts of what zoologists called "the Ethiopian region." The general physical characters of Africa, south of the Sahara, were then shortly described and its principal rivers, lakes, mountains and deserts pointed out. In Africa proper, three zoological subregions might be recognized: (1) The *Saharan subregion* characterized by its gazelles and other forms of desert-hunting antelopes; (2) the *West African subregion,* consisting entirely of dense forest tenanted by anthropoid apes and a few forest-loving antelopes, and (3) the great *Cape subregion,* which extended from the Cape Colony far northwards and embraced a broad tract of country all up the eastern coast to Somaliland. The last subregion was that in which the larger mammals, or what were now commonly called "big game," were so abundant and, indeed, much more abundant than anywhere else in the world. After pointing out the 14 orders of mammals, into which this class of the vertebrata is usually divided by naturalists, Mr. Sclater selected six of them as containing sets of specially typical African mammals. Among the quadrumana the gorilla and chimpanzee, two

of the most highly organized anthropoid apes, were specially African, besides which all the remaining genera of African monkeys were peculiar to that continent. As regards the carnivora, the larger cats of Africa (the lion, the leopard and the cheetah) were common to Africa and South Asia, but many of the genets, ichneumons and other smaller carnivorous animals were peculiar. The hyraxes or rock-coneys, small rodent-like animals, structurally allied to the rhinoceroses, were entirely restricted to the Ethiopian region. Of the elephants, which formed an order for themselves, one very distinct form—the African elephant —was entirely restricted to Africa. It was specially in the great order, ungulata, or hoofed animals, that the mammal-fauna of Africa exceeded all others in numbers and variety, as shown by the presence of rhinoceroses, zebras, buffaloes, antelopes, giraffes, hippopotamuses and wart-hogs throughout the continent and these were especially prevalent in what was called the Cape subregion, to various parts of which, in consequence, hunters after "big game" had always turned their special attention. Of the varied group of antelopes nearly 100 African species were now known, some of these, such as the koodoo, eland, sable and roan antelopes and waterbucks, being especially remarkable for size and beauty. In one district of British East Africa, which had been aptly named the hunter's paradise, Mr. F. J. Jackson had catalogued upwards of 30 species of antelopes to be met with. In Somaliland, Captain Swayne had found nearly an equal number. The hippopotamus, also belonging to the ungulates, was met with in all the principal rivers and lakes of Africa, but not elsewhere. A second small hippopotamus was found only in one river in Liberia. The wart-hogs and river-hogs were the peculiar Ethiopian forms of the pig-family and the order of edentates was represented by the ant-bears, which were restricted to this continent and by several species of Manis or Pangolin. Thus there could be no question that Africa, south of the Sahara, was emphatically the land of big mammals. In conclusion, the lecturer pointed out the very serious diminution of the larger African mammals, especially of the Antelopes caused by the progress of civilization and by the slaughter of the sportsman, and insisted on the necessity of the nations of Europe, who had lately parcelled out the African continent amongst themselves, instituting stringent regulation for the protection of the larger mammals in their various colonies and protectorates.

The proceedings concluded with a hearty vote of thanks to the lecturer.

THE DUTIES IN "ACTION" OF THE LIEUT.-COLONEL COMMANDING A SIEGE TRAIN DIVISION.

BY

MAJOR E. G. NICOLLS, R.A.

(A Lecture delivered to the Long Course Officers and N.-C. Officers at Shoeburyness, June 5th, 1896).

Introductory.

THE following remarks are intended as a sketch of the general duties that would devolve upon the Lieut.-Colonel in command of a S.T. Division, when *fighting* his command; they are in no way authoritative, and are merely an expression of the opinions of the writer.

S.T. Division.

A reference to S.A.D., pp. 240–41, shows that a S.T. Division consists of 16 pieces manned by four companies under the command of a Lieut.-Colonel, who has on his staff one Adjutant, one Quarter-Master, two staff N.-C.O.'s and two clerks.

These 16 pieces would in all probability be divided into, and placed in, batteries of four guns each, one company of the S.T. being told off permanently to each battery.

Object of Siege fire.

The duties of the Lieut.-Colonel in "Action" comprise all the means necessary to the proper fighting of his command, so that the most accurate and effective fire possible may be brought to bear upon the defender's ordnance and works as to effectually silence and destroy them with the least possible expenditure of ammunition in the shortest reasonable time and thus to prepare the way for the final infantry assault, by which means alone it can be hoped that the capture of a well organised and properly defended land fortress may be achieved.

Classification of duties.

To this end his duties may be summed up generally as including—

1. Supply of ammunition.
2. Regulation and strength of reliefs.
3. Control of fire.

The first two are matters of organisation which it should not be difficult to provide for by regulation and on which, therefore, one feels somewhat diffident about venturing an opinion, and I do not consequently propose to do more than offer a few remarks under these two heads.

Supply of ammunition.

1. The instructions for the issue and supply of siege stores given in S.A.D., pp. 15–19, are very general and do not go far beyond the transfer of such stores from the Ordnance Department to the R.A., but on p. 16 it is stated that different portions of the attack should have their own advanced depôts and it is presumed from this that each unit (and for siege purposes the division must be considered the unit) will have its own depôt and be responsible for its own stores. This depôt must be directly under the Lieut.-Colonel, and for its proper supervision and management he will require a sufficient staff. That already allotted to him appears to be intended for camp work and discipline only and an addition must be made to it for the store departmental work. The minimum necessary would seem to be—

Staff required.

One officer, two conductors or park sergeants and a certain number of district gunners.

This staff would probably be sufficient where one depôt supplied the whole Division, but, where the nature of the ground did not admit of a sufficiently large depôt being formed, or the distance of batteries of the Division rendered supply from such a single depôt laborious and slow, it might be necessary to divide and distribute the stores into sub-depôts and then a larger staff would probably be required. But, in any case, the higher and more responsible posts in the depôt should be filled by men accustomed to the keeping and issue of stores, ammunition, etc., and probably the post of officer in charge of the depôt would best be filled by an officer of the District Establishment or a W.O., such as a Master-Gunner. The district gunners would probably have to be supplied by the companies.

Amount of ammunition.

The amount of ammunition kept in the depôt should be equal to, at least, one day's supply to all the batteries of the division and must always be kept up to this amount. All stores and ammunition should be so arranged as to be readily issued as required.

Issue of ammunition

A fixed time should be notified in orders at which ammunition can be drawn and it should only be issued on requisition by each B.C., countersigned by the Adjutant, who should check the requisitions to see that more than the authorised amount [1] is not demanded without sufficient reason. Arrangements should be made for the immediate replacement of the ammunition issued from the intermediate depôts or field arsenal, as the case may be, and it would probably be convenient to fix a regular hour when this work should be daily carried out. Except under very unusual circumstances, one issue of ammunition daily should be sufficient.

Reliefs.

2. The S.A.D. provides for two reliefs for the force composing a S.T., each relief to be on duty for 12 hours, and it will, if this is not ordered by higher authority, devolve on the Lieut.-Colonel to arrange the hours at which reliefs should take place and the strength of each relief. At first sight it would appear that the simplest way to arrange them, when only two reliefs of 12 hours each are required in 24 hours, would be to divide each company in half, giving one 12

[1] *See* p 43.

hours, beginning from a stated hour to each half company ; this would necessitate the same men being always on night or day duty, which, though it has the advantage of insuring the same duties being carried out by the same men under nearly always the same circumstances, does not seem desirable, as it obliges one half company to be always on duty at night and thus deprives some of the men of their regular rest. A better plan would possibly be to divide each company into three reliefs thus :—

Proposed division of reliefs.

Taking the strength of a company, allowing for sick and casuals, at 100 for gun detachments only and exclusive of officers, N.-C.O.'s for observing, etc.

1st relief, 40—from 6 a.m. to 6 p.m.

2nd relief, 20—from 6 p.m. to 6 a.m.

3rd relief, 40—from 6 a.m. to 6 p.m.

Only two reliefs would be employed on any one day, the 1st for day work consisting of four detachments who would be relieved at 6 p.m., by the 2nd relief of 20 men only for night work ; this relief can well be reduced by half, for the fire by night is certain to slack off very considerably and a sufficient fire for all ordinary purposes could probably be kept up by half the number of guns employed during the day. The 3rd relief not being required for the batteries would be employed in making up what ammunition was required in replenishing the battery magazines and the depôt and so on and would come on for day duty the next day. Each night relief, as it came off duty, would be absorbed into the previous day relief and not put on trench duty again for 24 hours. By such an arrangement no man would be on night duty in the trenches oftener than once in every five days.

Hour of relief.

The hour at which reliefs should be carried out is also a matter for arrangement by the Lieut.-Colonel (if not determined by higher authority) and should be fixed with reference to the circumstances and time of year. Daybreak is generally considered the time when sorties or attacks are most likely to be delivered and, therefore, a good time for the reliefs to take place, as it insures the maximum of men being under arms in the trenches at that time.

Control of fire.

3. *Control of Fire.*—This may be considered to be a tactical question and, therefore, one that affords scope for discussion and admits of some expression of opinion. The term itself, "Control of Fire," must be taken as a comprehensive one and must not be confused with the "direction of fire." By the latter it is intended to express the action of directing the fire of a certain number of guns on to a selected object in other words, of ranging and fighting a battery ; it marks distinctly the province of the O.C. the battery, on to this the Lieut.-Colonel will not trespass without good cause, but, having once allotted the task, will leave the completion of it to the man best placed to carry it out, viz., the B.C.

Duties involved in turn

In the expression, "Control of Fire," I include then the following

which, though distinct, cannot well be separated nor placed in regular sequence. They are—

(i.) Apportionment of the target among B.C.'s.

(ii.) Indication of the target to B.C.'s, including any change of target.

(iii.) Regulation of fire, including (*a*), the rate of fire to be maintained; (*b*), the nature of projectile to be used; (*c*), the actual number of rounds to be fired in any given time.

Apportionment of target.

(i.) In allotting to each B.C. his particular portion of the work to be done, the Lieut.-Colonel would, of course, be guided by the relative position of each of his batteries and the portion of the enemy's works to be attacked, selecting the target for each battery so as to obtain, as far as possible, a direct, or enfilade fire for each. The hope of the besiegers must lie in bringing a superior volume of fire to bear on the enemy's guns so as to silence them and where this superiority in number of pieces has been obtained it will, doubtless, be good policy to concentrate the fire of two or more batteries on one of the enemy's, but if this superiority of fire on the part of the besiegers is not strongly marked it seems doubtful whether it would be sound to attempt thus to destroy each of the enemy's batteries in detail, leaving perhaps one or more of them for a time unmolested to annoy or injure you. Such a concentration means a considerable waste of ammunition, as it would take, at least, 10 rounds to range each battery. Thus, to take an extreme case, supposing that the four batteries of the Division were engaging four of the enemy's and the fire of all four was concentrated on each in succession, it would take 160 rounds to range, most of which would probably be wasted, whereas if each battery attacked one of the enemy's, only 40 rounds would be so wasted, and supposing that it took 100 rounds, exclusive of the ranging rounds, to destroy each of the enemy's batteries and that these rounds were fired at the average rate of 20 per hour, it would take in the first case 140 rounds from each battery and seven hours to complete the task; in the second, 110 rounds per battery and five and a half hours, a considerable saving both in time and ammunition, with the additional advantage that probably the 110 rounds fired continuously from each battery at the same target would do its work much more effectually than the 35 rounds each fired by the four batteries at four different targets.

Concentration of fire

Other considerations.

This is a point that will have to be taken into consideration by the Lieut.-Colonel in apportioning target and it will be necessary for him to determine how best the maximum effect can probably be obtained with the least expenditure of ammunition; but he should also be guided by the nature and calibre of the ordnance with which his batteries are armed.

Heavy howitzers like the 8″ may be expected to do at least double the work for the same expenditure of ammunition that can be looked for from the 6″ or 6·6″ howitzers.

Again, howitzers on mountings, admitting of any elevation up to

70° being given, will be available for special work that other howitzers could not do so well; while batteries supplied with high explosive shell will often probably be more advantageously employed in some particular manner than in joining in the regular artillery duel.

All these points and probably several others must be taken into consideration in allotting their targets to the batteries.

(ii.) The indication to B.C.'s of the position of the target which they have to engage and destroy is, perhaps, the most important and difficult of the Lieut.-Colonel's duties in action. On the means employed to this end will depend in great measure the fire effect obtained by each battery and probably the consequent duration of siege operations. Indication of target to B.C.'s.

Hitherto this question has not received the attention that its importance demands; up till now our endeavour has been, and no doubt rightly, to introduce and perfect a sound system of battery fire discipline, this, I think, we may safely admit has now been obtained, as reference to the Practice Reports from Lydd for the last two years will show, and the time now seems to have arrived when we should turn our attention to the question of how the fire of any one or more batteries is to be turned, at will, on to any one of several objectives which it is desired to destroy. Importance of the question.

This demands some kind of target-indicator. No doubt several such instruments might readily be devised, which would, more or less, answer the purpose, but before considering the actual form of such indicator, it will be as well to remember what the general disposition of batteries and observing stations of the attack will probably be. Target indicator. Disposition of batteries and observing stations.

The principles involved are—

(*a.*) That the batteries must be placed in positions concealed from the enemy's view.

(*b.*) That the observing stations must be placed in commanding positions, from which as much as possible of the surrounding country (especially to the front) is visible.

The O.C. the battery must be in the battery, only N.-C.O.'s or men will, as a rule, be in the observing stations. The B.C., therefore, is not in a position to determine the desirability of a change of target or to order it on his own initiative as he is dependent entirely on his observers and has no means of judging either the effect of his own fire or what points in the enemy's line are most vulnerable or most necessary to attack.

This must, therefore, necessarily become the province of the Lieut.-Colonel; it is he who must determine what portion of the enemy's line each battery is to attack, who must point out to B.C.'s their targets and issue the necessary orders.

To do this satisfactorily, his own position or fighting post must be one from which he can get a good general view of the country and the enemy's works and he must be provided with— Lt.-Colonel's Fighting-post.

(1.) A set of observing instruments and observers.

(2.) A plan of the country showing clearly the positions of his batteries, his own and all other observing stations in his command and as much detail of the enemy's works and position as can be obtained.

(3.) Means of communication with his B.C.'s and his own observers.

(4.) Means of indicating to B.C.'s the results of his observations and his orders thereon.

Position of post.

The Lieut.-Colonel's fighting-post, therefore, should be, if possible, in some central position in advance of the batteries of his Division and from which a good view can be obtained.

Lt.-Colonel's observers.

(1.) It will not do for him to have to rely on any of the battery observers for information, their attention and their instruments must be fixed on the target which their battery is, for the time being, attacking. He must, therefore, have observers of his own whose movements he can completely control and to whom he can issue instructions without interfering with the fire of any battery. These observers should be placed close to his own fighting-post; in fact, one of the instruments should be located at his post, so that he can himself use it if he wishes to, the other may be placed in any convenient situation.

Plan or map of country.

(2.) No doubt in a siege, plans or maps of the country, as far as they were obtainable, would be furnished to C.O.'s, but these would probably not be on a sufficiently large scale or have sufficient detail to be of real practical value to the Lieut.-Colonel. It would be necessary for him to obtain what he required either by detailing his Adjutant or some other officer in the Division who was good at military sketching to make the required sketch, which should be on a large scale, at least 12″ to a mile, but some such scale as 100 yards to one inch is preferable. The selection of all observing stations in his command would be one of the duties of the Lieut.-Colonel and this would be carried out as soon as the side to be attacked had been chosen and as far as the battery observing stations went, in consultation probably with the B.C.'s. There would, therefore, be ample time to complete such a sketch as was required before it was necessary to open fire. Such a sketch must show as accurately as possible the exact positions of all observing stations, the Lieut.-Colonel's fighting-post and the position of the different batteries, magazines, etc. As far as the enemy's position was concerned, details regarding this could be filled in to scale from the maps provided. The observing stations should be numbered according to their batteries thus: R.O. (1), L.O. (3), or the letters *A* and *B* might be used for

Details to be shown on plan.

right and left observers and their positions should be marked on the plan by small circles, R.O. stations in red, if possible, so as to be easily distinguished and recognised.

(3.) The means of communication with B.C.'s and the Lieut.-Colonel's observers would probably be telephonic or telegraphic; it is not necessary for the Lieut.-Colonel to be in communication with the battery observers, as all orders to them would necessarily be through their C.O.'s. Means of communication.

(4.) In order to indicate to B.C.'s the direction of the targets they are to engage, two things are necessary :— Requirements for target indicating.

(*a*.) That the Lieut.-Colonel should be able to ascertain definitely the position of the target and communicate it as definitely to B.C.'s.

(*b*.) That B.C.'s should be able, by the orders they give to their observers, to get them to set the instruments as required so as to be on the spot indicated.

Both of the requirements can easily be obtained by a very simple process, viz., by orienting the Lieut.-Colonel's plan and all observing instruments. In the School of Gunnery Report for 1895 it is recommended that observing instruments should be fitted with box compasses and no doubt all will shortly so be fitted, the process of orienting them will then be a very simple matter, but the need for this will necessitate some alteration in our present system of setting these instruments up; instead of laying each instrument at zero on the other, we shall have to adopt the plan of orienting each instrument at starting and reading off the bearing to the target instead of the angle.[1] I do not suppose that there will be any difficulty in working the instruments thus; when the observers get used to it, it will be as easy as the present method. Orientation of instruments and plans.

Orienting the plan.

The Lieut.-Colonel's plan would, of course, be oriented, but if he is to indicate his targets with ease and rapidity, the mere fixing of the north point will not be sufficient. His plan will have to be specially prepared with this object; no doubt there are several ways of doing this, but the method I should advocate is as follows :—

Through the positions on the plan representing the observing stations, magnetic north and south lines of sufficient length should be drawn. A circular protractor as large as possible, and graduated to quarter degrees, should be used in conjunction with a straight-edge graduated in 100 yards to the same scale as the plan and constructed so that it can be pivoted on a drawing pin at the centre of the protractor.

The method of procedure would be— Method of procedure

The Lieut.-Colonel having ascertained from a study of his map and an actual examination by glasses, or the observing instrument at his

[1] A method of target indicating which requires no alteration in existing method of setting up instruments and is, moreover, more accurate than the one here suggested, has been proposed by the Instructor of Gunnery at Lydd and was tried there this year with success.

station, of the ground in view and probable position of the enemy's guns, would direct his observer on to the required spot and order him to clamp his instrument as soon as he had laid it on one of the enemy's guns, he would then set off the bearing of the instrument by means of his protractor and straight-edge on his plan and estimate the range by aid of his map, this would enable him to direct the other observing instrument on to the same spot approximately and he would send down some such order as this to the observer: "Set your instrument at bearing ——; look out for any gun firing from that direction and send in reading of any observed at once." As soon as the other observer had succeeded in doing this, the approximate position of the gun observed could be formed on the plan by setting the straight-edge from each observer at their bearings and this spot would be marked on the plan. The protractor and straight-edge would then be placed in turn at the positions on the plan, representing the two observers of the battery whose fire it was intended to direct on to this target and the bearings from each observer could thus be approximately obtained and the range from the battery measured.

Lt.-Colonel's orders.

The Lieut.-Colonel would then send down an order of this nature to each B.C.: "Engage enemy's battery of three (or four) guns—

(Apparently) bearing from your R.O. ——
" " " " L.O. ——
Approximate range —— yards.

Report when target has been picked up, sending readings of each instrument."

B.C.'s orders.

On getting such an order, the B.C. would at once telephone to each observer in this manner: "R.O. or L.O. search for enemy's guns at bearing ——; clamp instrument as soon as one flash comes in field and send me all readings of other flashes observed." As soon as each observer had carried out these instructions the B.C. would, from an examination of the readings received, put each observer on the same gun in the usual manner and report to the Lieut.-Colonel in this wise.

"Both observers have picked up target, R.O. is clamped at ——, L.O. at ——." If the readings thus received appear to correspond satisfactorily with the bearings of the target from the C.R.A. observers, the Lieut.-Colonel would send in reply, "commence firing;" but if he is in doubt as to whether the observers have picked up the target which he wishes the battery to engage he would send in reply, "stand fast," followed by further instructions.

Remarks.

In this manner the fire of any battery could be directed on to any target and the position of it or any change of target easily indicated to each B.C. as desired. The bearings sent down originally by the Lieut.-Colonel would probably only be approximate ones and absolute accuracy is not to be expected nor necessary, but if the plan has been carefully made out and the positions of the observing stations correctly marked, these bearings should be so nearly correct as to admit of the battery observers picking up quickly the required target from the instructions received from the B.C.

A word or two before leaving this subject regarding the selection and nature of observing stations and the Lieut.-Colonel's fighting-post. All such stations must be placed in commanding positions whence a good view of the country in front can be obtained up to a distance of about 4000 yards and through an angle of 60° at least; they should not be placed on the sky line and should be concealed as naturally as possible, not by making revetted cells covered over with boarding or corrugated iron or anything of that sort, but by utilising the natural configuration of the ground, hedges, bushes and banks; if cover is required for the observers it should be placed close to and at the side or in rear of the stations and so as not to be in sight of the enemy. Selection of observing stations.

Field observations only serve to draw fire, they may thus render some service by causing the enemy to waste ammunition which might otherwise be used against the batteries and, even if they do not (as is probable) suffer much from such fire, they will be of little use as observing stations, for observation under fire is not likely to be reliable and therefore will be useless if not dangerous. Field observatories.

Trees, on the contrary, if not isolated (and so conspicuous marks), and if fitted with platforms secured to the branches on which instruments might be placed, might often be usefully employed. Trees.

Captive balloons are quite useless for any purposes of observation of fire, though for general purposes and observation of general fire effect they might often, no doubt, be usefully employed. Captive balloons.

(iii.) Regulation of fire is a very important part of what might be termed fire economics, the object of it being to prevent waste of ammunition and to get the maximum effect from the rounds actually fired. The labour and transport involved in taking up to the front sufficient ammunition to keep up the supply of 100 rounds per gun per diem for a Division is so great that economy of ammunition becomes a very important question. By economy of fire is meant not the saving of ammunition, but the prevention of waste and this can only be effected by a proper regulation of fire. If B.C.'s think they can easily obtain as much ammunition as they like to demand, they will naturally not be particularly careful of their expenditure, but if they know that the supply is limited and a vigorous account of expenditure will be demanded, they will, as naturally, try and make the most of what they have got and seek to obtain as many effective shell as posssible and thus a true economy will be established. Regulation of fire.

In regulating, therefore, the fire of his Division, the Lieut.-Colonel will have to consider—

(*a.*) The rate of fire to be maintained.

(*b.*) The nature of projectile to be used.

(*c.*) The actual number of rounds to be fired in any given time, say 24 hours.

(*a.*) The rate of fire for Siege Artillery is slow fire, the actual interval to be maintained between rounds must depend upon circumstances; when a general bombardment is intended to cover the infantry assault the fire cannot be too rapid; (2) when ranging on a new target Rate of fire

the fire should be comparatively rapid, so to obtain an effective fire on the enemy before he can so reply to yours, once the range has been obtained and the fire is to be continuous, its rate should be diminished both to economise ammunition and to save the men.

Allowing 100 rounds per gun as the normal supply for 24 hours we get a total of 400 rounds to be fired by each battery in that time; again, supposing that the rate of fire is to be one round in every three minutes by day and that this rate is to be double that maintained at night, he should get for 12 hours day at 20 rounds per hour, 240 rounds for night. Twelve hours at 10 rounds per hour = 120, or a total in 24 hours of 360 rounds, a number which would keep us comfortably within the limits of the daily ammunition supply, and yet which should be sufficient to allow of an effective and well sustained fire being kept up.

Nature of Profectiles.

(*b.*) In selecting the nature of projectile to be employed, the Lieut.-Colonel's choice would be very limited, it lies, in fact, between the use of common-powder shell, and high-explosive shell, any other kind of shell is practically not worth firing from howitzers. The actual choice must present a question of some difficulty to the Lieut.-Colonel, for, in the first place, the supply of H.E. may be very small, in which case, of course, their use must be very limited; in the second place, he must take into consideration the nature of the target (as far as he knows it) and the effect that it is sought to produce. Experiments so far have shown that the full effect can only be obtained from H.E. shells by using delay fuzes, these are most difficult to observe accurately owing to the uncertain length of time from impact until the burst is observed and, therefore, for ranging D.A. fuzes are recommended, but this means that even good shell in the ranging rounds will probably be less effective than equally good powder shell and, therefore, less effect may be obtained at this stage with H.E. than by using C.S. When it is necessary to get down the fire of an enemy, who has established his fire, as quickly as possible, this may become an important consideration. On the whole, the safest rule would seem to be, in most cases, especially when in doubt, use C.S. (powder).

Number of rounds in 24 hours.

(*c.*) The issuing of orders as to the actual number of rounds to be fired in the 24 hours may seem to be superfluous after the rate of fire has been ordered, but consideration will show that it is necessary both to check the expenditure of ammunition and to admit of a proper supply being kept up in the magazines and depôts. For although the average rate may be laid down, it must be remembered that, when ranging, the B.C. will have to fire comparatively rapidly, he may have to range on more than one target during this period and, while so-doing, he is certain to exceed the average rate of fire ordered; if, when he drops down to the ordered rate, he continues firing, regardless of the total number of rounds fired, he may exceed his allowance and thus be without sufficient ammunition for the next 24 hours when, perhaps, more important work has to be done. The total amount of ammunition to be fired in one day should, therefore, be ordered by the Lieut.-Colonel for each battery of his Division and it is to see that this

amount has not been exceeded that it was suggested above (p. 34) that daily requisitions by B.C.'s for ammunition should be countersigned by the Adjutant, as he would be aware of the orders given and of the amount in the depôt magazines and by thus checking the requisitions can prevent any failure of ammunition supply arising from an undue expenditure.

The Lieut.-Colonel's orders to B.C.'s then would take the following form :—

Projectile to be used = C.S. or H.E.
Average rate of fire = 15 rounds per hour or—
20 „ „ „ etc.
Total number of rounds = 350 (or 400) to be fired during 24 hours.

I have endeavoured to indicate above what, in my opinion, are the general duties of the Officer Commanding a Siege Train Division, with the desire of calling attention to the subject so that it may not be lost sight of among the many and important questions calling for consideration from the officers of the Regiment.

ARTILLERY FROM AN INFANTRY OFFICER'S POINT OF VIEW.[1]

A CRITICISM.

COMMUNICATED.

THE following remarks on Captain Pilcher's lecture on "Artillery from an Infantry Officer's Point of View," which he delivered at the R.A.I., Woolwich, on the 12th March, 1896, are made by a German General officer, an acknowledged authority; the Committee have much pleasure in publishing them and gratefully tender their thanks to the writer for placing at their disposal so valuable a criticism.

It is most important at manœuvres that the effect of artillery fire should be made known by umpires to all whom it may concern. Page 261 (last paragraph).

I most fully concur with Captain Pilcher's remarks concerning the necessity of the commander of a unit separating himself from his unit, and this applies doubly if his unit is acting independently; under these circumstances it is the duty of the commander to think of the tactical situation and not to bother himself with the details of drill. If his second in command or other officer whom he may delegate is not capable of giving the proper words of command, or leading the troops in the required direction, the unit had better remain at home. Page 263.

Too much stress cannot be laid upon the necessity of opening fire with all your batteries simultaneously and not giving the enemy an opportunity of dealing with you in detail, and should one or two batteries come into position before the rest, they should, under ordinary circumstances, wait until the remainder have come up before disclosing themselves and so drawing upon them the whole hostile fire.

Captain Pilcher goes rather too far in saying that indirect fire is rather the rule in Germany than the exception. In many, I may say, in most positions where many batteries are in line, some of the guns have to be laid indirectly, and indirect fire may often be advantageously resorted to when coming into position against an enemy already in position, and decidedly should be if coming into position against a

[1] The numbers in the margin have reference to the pages of the lecture by Captain T. D. Pilcher as published in No. 6, Vol. XXIII., R.A.I. "Proceedings," June, 1896.

superior enemy. The rule is, however, direct fire, from which better results can be obtained, and this, of course, applies doubly against a moving object. If in a long position some batteries have no choice but to fire indirectly or to advance to the crest of a hill, to fire indirectly is the better alternative.

Page 264. To take up positions with guns at 40 paces interval is an excellent expedient for deceiving the enemy as to the strength of your artillery.

How far artillery should accompany infantry during the attack must entirely depend upon the country and the artillery positions; for instance, if artillery are in position at 2500 yards they should, if there is another position at 1400 yards, advance to it, for from this latter distance it is much easier to distinguish your own from the enemy's infantry. There is, however, but little advantage under ordinary circumstances in pushing up to within effective range of hostile infantry fire when your guns have equally good effect from a greater distance. In the defence it is essential that the artillery should, to begin with, be at least 500 yards behind the infantry.

Page 265. To occupy a position, or any part of a position, before you have sufficient grounds to be certain that the enemy intends to attack it, is a cardinal fault, for troops once committed to action cannot be withdrawn and are lost to the commander for the day.

Page 266. I fully concur with Captain Pilcher's remarks as to the necessity of keeping the whole of the troops firing at you under fire; there is, however, no rule without exceptions, and if I had three batteries in position against three hostile batteries, one of which was very visible, one fairly visible and one under cover, then I should concentrate the fire of two batteries on the most exposed and with the other battery return the fire of the other two.

Page 269. The principle laid down that, in a retirement, infantry should never allow hostile infantry to get within 600 yards of them, or that otherwise they will find it impossible to withdraw, is a perfectly sound one, but one which is easier to lay down than to practise and, moreover, is a point to which attention is called year after year at our manœuvres.

In retirements great depth of formation is necessary.

It is perfectly true that the only way of sending up orders to the firing line will be through reinforcements and that once committed to action a company commander will be independent; consequently, it is essential that company commanders should know the object their General has in view and should be able intelligently to appreciate the situation and to work to that end.

I stated just now that direct fire was the rule, but every care should be taken to avoid exposing the horses of a battery when coming into position and only the muzzles of the guns should show above the crest. I quite agree with all the lecturer said except the one point regarding indirect fire being the rule and upon this I have expressed my opinions.

Page 273. With regard to the remarks on p. 273, forgive the expression, but I consider that to send two guns with an advanced-guard is "playing at soldiers." We very seldom send artillery with an advanced-guard if the force is less than a division and often not even with the advanced-guard of a division.

Roads are good in most civilized countries, and artillery can quickly be trotted up. Besides it being essential that all batteries should open fire simultaneously, and should work in conjunction, there is seldom any advantage in having two or three batteries a mile and a half in front of the rest of the artillery.

With regard to the remarks on p. 274 it is perfectly possible to concentrate your fire by means of indirect laying. Again, I have often seen 76 guns in position without more than the muzzle of a single gun being exposed. Page 274.

Before 1806 some few German officers, more advanced in thought than the rest, advised making use of ground and of cover, but the majority, instigated by the same spirit with which some of the officers taking part in the discussion seem to be imbued, answered, "What! shall the army of Frederick be made a school for cowardice! No, never." They refused to practise the use of the ground and the result was JENA and AUERSTEDT.

To say that to make use of ground in any way destroys "*der geist der waffe*" (the spirit of the arm) is nonsense. I have already said that "*wirkung geht vor deckung*" (effect comes before cover), but this is 1896, not 1870, and the effect of infantry fire must be multiplied by four or by six in comparison with what it was in 1870, and what is the good of artillery coming up close if by doing so the effect of their fire is not greater. The effect of artillery fire is equally great at 600 or at 1200 yards, but if under infantry fire their losses at the latter distance would be enormously greater; another point to consider is that if you come too close you cannot feed your guns, for your ammunition carriers will all be shot.

That great authority, General von Goeben, says: "Artillery is a fine instrument which must not be put into the first line except under most exceptional circumstances."

There are two ways of training men, you can teach them to be "*dumm dreist*" (bold through stupidity), to disregard cover and to believe there is nothing to fear if they keep a bold heart; the other system is to teach men what dangers there are and how to avoid them, just as a sailor or a steeplejack is taught how to appreciate and how to avoid the dangers of his trade. Men trained on the former system find out on the first day of battle that their teachers have lied and lose all confidence in them. Such training may sound excellent in peace, but will not stand the strain of war. The second will stand any test.

It is quite true that it can only be a surmise that the effect of the enemy's fire decreases 50 per cent. directly he hears bullets whistling about his own head. This is quite true, but still, those who have been under fire for hours at a time, as I have been on several occasions, are able to make a pretty good guess.

In the third act by all means concentrate your fire upon the point of assault; but, as I have said before, at the beginning of an action, the only sensible rule is to keep all the troops firing at you under fire and to trust by better fire discipline to obtain an ascendancy.

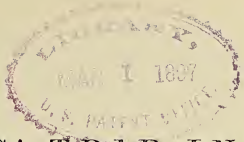
We have to reckon with human beings of flesh and blood and not

with automatons.

I perfectly agree that men, horses and harness should be clean, but to be well turned out should not be the aim and object of a soldier's existence, which, if too much worth is laid upon it, it is apt to become; and I like to have kit and accoutrements which require as little cleaning as possible, for men have so much of more importance to learn, that they cannot spare too much time to cleaning saddles and harness.

My own opinion of high explosives is that their action is very uncertain, sometimes the effect is very small and on other occasions very great, a good deal depending upon the visibility of the object fired at. I think their chief effect will be a moral one.

In conclusion I have only to add that I am pleased to see that such a great authority as Sir Redvers Buller so absolutely concurs in my opinion as to the desirability of having commanders a long way in front of the units which they command.



A TWO MONTHS' TRIP INTO MONGOLIA.

BY

LIEUTENANT C. N. BUZZARD, R.A.

The craze for pony racing in the sea ports of China causes a fairly large trade in horse flesh in that country. The ponies are brought down from the plains of Mongolia *viâ* Peking to Tientsin and thence to Shanghai, Amoy, Foochow, Hong Kong and other places where sufficient Europeans reside to organize a race meeting. With the exception of some usually indifferent horses obtained from the Eli district, anything over 14 hands is practically unknown to the Mongols and Northern Chinese, and these people were, till last year, under the impression that their steeds were the fastest in the world.

Being lucky enough to obtain occasionally a couple of months rest from our arduous duties in Hong Kong, T—— and I decided in July last to travel north of Peking with an Australian mare to convert the Mongols and also to explore the country and shoot.

Our route consisted of a three-days' journey by P. and O. steamer to Shanghai and thence by local steamer four days to Tientsin. Leaving Tientsin, we were to travel three days by road and river to Peking and, from the capital, about 250 miles, by road or track to Dolon-Nor in Mongolia.

The mare, which T—— had obtained from Singapore, was sent on to Tientsin by steamer a week or two ahead of us, and on Sunday the 25th August we embarked at Hong Kong with somewhat heavy luggage consisting of saddlery, guns, ammunition and supplies.

Things went smoothly enough until we arrived at Chefu, where we were unfortunate enough to lose some useful baggage. We had brought with us some polo sticks, riding whips, a hunting spear, etc., in a bundle, which we had omitted to label, and the Chinese head steward sent these ashore with one of the passengers, an extremely devout missionary in Chinese dress, with head shaved in front and pig-tail complete thinking, I suppose, that this gentleman was about to institute a clerical polo team!

The river of Taku was not sufficiently deep to allow of our steamer proceeding to Tientsin, so we were obliged to go by train.

This railway, I believe the only one in China, runs through 40 miles

of flat marshy country to Tientsin. It is apparently greatly patronized by the natives and one would have thought that this would have induced the Chinese to construct other lines. The Mandarin classes, however, as a rule, do not appear to appreciate the progress of the "foreign devil;" the fact is that they have money and certain means of obtaining it; and rather than run the risk of changing their profitable customs, they will travel in their springless, uncomfortable, and antiquated carts on miserable roads.

We reached Tientsin on the last day of August and were entertained and treated with the invariable hospitality one meets with in these places.

Having now reached the limits of steamer and railway, we set about finding carts and ponies. The Chinese cart is perhaps worth describing. It has two wheels, a cover of canvas with a small window, ordinary single draught shafts, and, like some place of torment that Harrison Ainsworth describes in one of his books, is so arranged that you can neither stand, sit, nor lie down in it.

However, as our carts were quite full of provisions and stores, when tired we sat on the shafts.

The carts are drawn by two mules tandem fashion, the driver walking, or sitting on the shafts, and talking to his beasts from the time they are harnessed till they roll on the ground in the evening after their day's work.

The mules are invariably watered immediately after they have been fed and frequently suffer, in consequence, from colic; whereupon the drivers cut their eyelids, a mode of treatment which I suppose is intended as a counter-irritant! We engaged four carts with two mules apiece, three drivers, a cook, a "boy" to attend on us and interpret, a "riding boy" as groom, and an extra "boy" to lead the horse.

We then obtained four ponies, T——, two boys and I riding, leaving the cook to sit in a cart.

We took a fair quantity of tinned provisions and what liquor and tobacco we required. None of the servants or cartmen had been more than a hundred miles north of Peking before, but as T—— already knew the road, we were not in need of a guide. The regular journey for a Chinese cart and two mules is about one hundred "lee," a little over 30 miles a day. They will travel this distance at the rate of something more than three miles an hour, and, provided they know where the next halting place is to be, they need little encouragement. We always contrived to halt for the night at large inns, where there was plenty of accommodation for ourselves and our beasts. These inns are all alike, consisting of a yard surrounded by single storey mud huts and stables, a large gate being closed at night and guarded by a watchman provided with a kind of rattle to let evil doers know that he is awake.

The dwelling rooms are all fitted with "khangs," which consist of a raised floor under which a fire, fed with refuse, is kept smouldering, the smoke being carried away by a chimney. We always dispensed

with the fire, owing to the inconvenience caused by smoke and also because the warmth was likely to bring out various insects from their homes in corners! The windows are of paper, which, being usually torn, does not as may be imagined keep the cold out.

From Tientsin to Peking the road was fairly good, but the sun was very strong. The country here, which was mountainous, seemed overgrown with "Kowliang," or giant Millet, whilst one occasionally obtained refreshing views of the river covered with junks and house-boats with picturesque brown sails.

On the third day after leaving Tientsin we reached Peking, fortunately before sunset, as these extraordinary people still close the gates of most of their walled cities on the approach of night.

It is not my intention to describe this interesting city; cholera had been raging previous to our arrival, there having been some thousand deaths in three months. As we intended staying there a week on our return journey, we only stopped two nights in Peking, changed what money we required into silver sycee, and, hiring three new carts, we set out on a fine sunny morning northwards.

We were seriously delayed in leaving the city by the funeral processions with musical (?) instruments, gongs, flags, and gay decorations, which blocked the streets as far as the great northern gate. Owing to this delay, we did not reach Nan-khau the first evening as we had intended, but were benighted, and as we approached a river which we were obliged to ford, we heard the deep notes of the bells carried by camels, and much to our disgust these "ships of the desert" reached the ford before us.

A camel in the day time usually frightens a horse not accustomed to the sight, but the effect on the mare of a thousand of these beasts passing in single file within a few yards of her, looking most weird in the dim light, was to absolutely terrify her, and it was all we could do to pacify her. We were detained an hour and a half by these camels, which were going to Peking for the season's tea, to be conveyed by this route to Russia. To add to our troubles one of the carts was overturned in the stream, much to the disgust of the bull terrier we had brought with us, and who was tied up within! Fortunately no damage was done, and we reached an inn at about 10 p.m., three or four miles from Nan-khau. Next morning we had some trouble with the innkeeper, and both sides becoming considerably heated, matters grew serious. We were thinking of our fire-arms, which were well at the bottom of our carts, when the boy, who was pale with fear, advised us to capitulate, which, as it only cost us a dollar, we did. This unpleasantness, 30 miles from Peking, was the only thing of the kind that occurred during our journey, and I have come to the conclusion that the Chinese are a very much pleasanter people when they have not come much in contact with Europeans. Travelling on these roads, one could easily imagine oneself carried back three or four centuries. No telegraphs, no railways, infamous roads, mails carried by mounted couriers, primitive houses and Chinese noblemen with their armed retainers on ponies ready for celestial highwaymen!

The scenery, as one goes through the Nan-khau pass, is very fine, and as the road mounted continually we had a severe day's work on the second day. At the end of the pass is the inner great wall of China, which is fairly well preserved; this wall is the one usually visited by tourists, the outer wall, which runs along the summit of hills above Kalgan about 100 miles further on, is very dilapidated and not much visited. On the evening after passing Nan-khau, we arrived at the gates of a walled city after sunset and were in some fear of not being admitted. However, our "boy" managed to arouse the watchman within and shouted to him that we were mandarins wishing to pass through the city, and much to our relief the gates were opened and we entered in the dark. This superb lie appeared to cost the "boy" no effort; indeed he was rather inclined to chuckle over it during the remainder of the evening. We relied for protection at night on our bull terrier and a "chow" dog. These dogs are excellent watch dogs, barking at the slightest sound, but are nearly always cowards.

A dog was practically a necessity in Mongolia, as we carried a large and heavy box of silver in sycee, a tempting bait for thieves at night.

There being no coinage but copper cash, about 1000 to the dollar, one is obliged to cut off pieces of silver and weigh them when purchasing articles. The wily Chinaman has usually two points of suspension to his balance, one to be used when he is buying, the other when he is himself the vendor.

On the third and fourth days after leaving Peking the country became barren, rocky and mountainous, and the roads terrible. At one part of a road which had been cut out of the side of a precipice, we nearly had a serious accident. A large flock of sheep was being driven in the opposite direction to that in which our carts were moving and with the natural perversity of these quadrupeds, they ran under the carts, between the legs of the mules, jamming themselves in to every corner. The mules of one of the carts became restive, and it was only by the strenuous efforts of our cartmen that they were prevented from rushing over the edge of the precipice, dragging the cart after them.

We saw a few partridges here, and as soon as I had fired my first shot, the chow dog set off homewards at full speed, being arrested after a two miles chase by the "boy," whom we despatched on a pony in pursuit.

Much to our surprise we were able to purchase here some excellent peaches and grapes, and these being absurdly cheap, we took in a stock. On the fifth day we reached Kalgan, a fairly large walled city lying at the foot of the mountains we were to climb to reach the grass country.

Here we were obliged to part with a pony, which was hopelessly lame from bruised feet, and we purchased two new ones from a Mahomedan dealer named Yin-Si, who was extremely attentive to our wants and full of importance. Hitherto the weather had been mild, but, as we were shortly to mount up to altitudes of between 4,000 and 5,000 feet, we purchased sheep-skin coats for ourselves, the servants,

the mare and the bull terrier. We left next day and proceeded up a road through a gorge resembling the moraine of a glacier, terribly bad travelling, but we were surrounded at the summit by the finest view I have ever seen.

From this height of some 4,000 feet we looked back over plains and rocky hills, which extend for over 1,000 miles, a view of grand desolation owing to the prevalence of rocks and absence of trees. To right and left stretched the real great wall of China, of which the towers are the only recognisable features. These exist at regular intervals in the chain, loopholed and in fair preservation.

A line of watch towers extends back to the inner wall following the route by which we had come. On these, in former days, fires were lit by the Chinese to give notice of the coming of the Mongol hordes from the north.

The temperature was not much lower, and the soil became more grassy.

That night the thermometer dropped to 32° F. and when we arose next morning it was bitterly cold and a layer of ice covered the pools left by recent rain. A cold biting wind blew across the plain and we were glad of our sheep-skins.

We reached Shibartai at mid-day and here the true grass country really begins.

As far as we could see there was nothing but grass; undulating hills rather like the downs in the south of England, perfect for riding in every direction.

We had now left the regular camel route to Urga, by which the tea is taken to Russia, and were following a wheel track in a north-easterly direction, leading to Dolon-Nor or Lama-miao, as the Chinese call it.

As a rule, in the day-time it was warm, and the glare from the grass at this altitude is painful to the eyes, necessitating the use of blue spectacles.

The second day on the grass two wolves crossed our path, but we had not our rifles handy and they stole away unhurt. As regards game in this country, we shot hare, teal, snipe, duck, partridge and plover, but as we were pressed for time we never left our road except to engage in futile attempts to stalk "Wongyhang," a species of antelope, which wander in large herds over the grass country, but are almost impossible to approach owing to the absence of cover.

On the third day we passed through part of the country which was entirely plough land on which very fine oat crops are raised.

This oat is peculiar in that it has practically no husk, or rather the grain is very easily removed. The horses once used to them seem very fond of these oats and the absence of husk saves the natives much trouble when grinding the grain, the flour making very fair bread. On this land there were huge numbers of some kind of bustard, but they would not let us approach close enough to use a shot gun, and we had to content ourselves with long rifle shots. Had we time for systematic shooting, I think we could have crept up disguised as

natives, but intending to hold a race meeting at Dolon-Nor, we travelled steadily on, never cutting short the day's journey. Indeed, unless you fix your halting places, you are liable to be benighted without shelter, as the Chinese inns are few and far between.

The Mongols are worth describing. The men are usually strong, thick set fellows, with round faces burnt a brilliant red by exposure and sun. The yellow colour peculiar to the Chinese is missing, but the eyes are the same in shape.

About one sixth of the race are "Lamas" or Buddhist priests, the people being extremely religious.

The Lama's dress is very picturesque, consisting of a long yellow coat with long sleeves covering the hand, over which is worn a short brown sleeveless coat or waistcoat.

A large yellow hat lined with fur or astrachan, long Chinese boots of leather velvet and a case, containing knife and chop sticks, complete the kit.

In the district through which we passed the men appeared to be nearly all Lamas, but this by no means interferes with their riding, racing and keeping ponies and cattle.

Except those residing in Lamarivals they invariably live in tents, being nomads. These tents are circular, having a hole for an entrance and another to let the smoke out. In their habits these people are stupid, honest and poor. They drink a good deal of bad spirit and never wash, which is hardly to be wondered at in such a cold climate, living in tents as they do. The women are also strongly made with round red cheeks. They are extremely fond of ornaments and married women always wear their hair divided in two long horns, which hang down by their ears and from which are usually hung silver ornaments and strings of beads. There seems to be a good deal of etiquette observed among the people.

We were sitting one day in one of their tents, the owner having supplied us with smokey cream cheese. A "lady" caller arrived, and entering the tent, handed her snuff bottle to our hostess, who, without uncorking it, pretended to take snuff from it and returned it. This formality was repeated by our friend, who then replaced her bottle in a drawer of a rough cabinet which stood in the tent. They then produced long pipes and proceeded to smoke.

The Mongols are good horsemen and should make good cavalry; all arms, however, are carefully kept out of the country, there being a customs station at Kalgan.

In spite of this, bands of brigands, 50 or 60 strong, reside in the country and our servants were in great fear when we were benighted, which occurred occasionally, owing perhaps, to an Englishman's objection to rising before six in the morning! The inns have all high walls and strong gates and Chinese soldiers reside in the small towers. Most of these warriors are armed with Winchesters, some with Mauser rifles; they are always mounted on ponies, which are taught to "pace."

On the fifth day after leaving Kalgan we arrived at Dolon-Nor, a large Chinese settlement, where there is a great Buddhist lamasery. It was here that we intended to astonish the natives with the Australian mare, who by her size had already attracted some attention. We were met some three miles from the town by a Chinese horse-dealer, whom T—— had met before, and whom we had informed of our coming. His name was Yang and he showed us the greatest civility during our stay.

On our dismounting in the inn yard a large crowd of Mongols and Chinese came round us, feeling our clothes, examining our boots and fondling the bull terrier, which I think was to them a more curious sight even than the large Australian horse.

About half an hour after our arrival we were sent for by the local mandarin. We proceeded to his house on foot, the distance only being a few hundred yards, with our "boy" as interpreter and the official received us, dressed in beautiful blue silks. Our passports were examined and we learnt that the Peking officials had sent notice of our coming; the mandarin was very affable, apologizing for not asking us in to tea, giving as an excuse that he was examining two prisoners.

The same evening he sent for our "boy," whom he catechised concerning our movements and intentions. He then sent round three of his retainers to attend on us during our stay and these people certainly were useful in keeping back the crowd which daily thronged to see us, putting their fingers through the windows (paper ones of course) and applying their eyes to the holes!

We obtained permission of the mandarin to have notices of the race meeting posted about the town, offering 30 taels of silver (about £4) to anyone beating the mare for three-quarters of a mile, also prizes consisting of cheap watches or money for other races.

The mandarin returned our visit a day or two later, coming on foot to see us. He was a Tientsin man and confirmed opium smoker. He told us that he could remember as a boy the British cavalry officers playing with him at Tientsin during the war; he did not seem to have taken their presence in China much to heart!

About a mile from the inn, a short way outside the town, we found an excellent snipe bog, and here we generally spent a couple of hours during the day bagging a few birds for our dinner. The race course was also a few minutes ride from the inn and was situated close to one of the two great Lamaseries outside the town. Here we generally came in the morning before breakfast for a gallop and on one of these occasions we met a Chinese Colonel, named Hoong, who was buying ponies for the Chinese cavalry. He was a jovial old fellow and asked us to go and have tea with him at the inn at which he was staying. There we were served with tea worth, I believe, nearly a tael of silver, or half-a-crown an ounce! It was of very fine flavour, but what somewhat disconcerted me was the fact that if I let a cup stand a moment to cool, as it was boiling when brought in, it was at once removed, and a fresh brew made as hot as the last! It was not therefore without some discomfort that we gulped down the precious liquid.

This tea I found was simply prepared by pouring boiling water on the leaves in the cup. As soon as the leaves sink from the surface of the liquid, it is no longer considered worth drinking and is removed.

Colonel Hoong showed us his sword, revolvers and peacock's feather, and after having asked him to officiate as judge at our race meeting, we left.

We had brought a few simple medicines with us, and usually received patients in the morning. Most of these were sufferers from ophthalmia, for which we prescribed boracic acid with so much success, that we became somewhat famous in the medical line and had some curious experiences. One old lady, whose sight was nearly gone from old age, sent round for "the cure!" A Mongol lama of about 50 years of age, on whose dried and wrinkled face not a hair was to be seen, gravely asked us for something to make his moustache grow! A Chinese sergeant—a well set up man and a very civil sort of chap—came to us with a bullet in his body, received in an encounter with brigands a fortnight before. The Röntgen rays not being available, we prudently did nothing but cleanse the wounds with antiseptics. However, he could walk about all right and announced his intention of having his revenge as soon as possible.

With our "boy" and Mr. Yang as interpreters for the Chinese and Mongol tongues respectively, we visited the great Lamasery, containing 2000 or 3000 Lamas. The Lamasery is a large group of buildings, in the centre of which stands the Mongol, equivalent to a church, where musical services, I believe, are held. There are also courtyards and cloisters in which one meets the old monks, as one might almost call them, in somewhat gay coloured clothing, but carrying similar strings of beads to those worn by European Catholics.

Even secular Mongols have I seen muttering prayers with their fingers on their rosaries. Entering the outer wall by a gate and passing among many outer buildings, we were escorted by a lama into a room of moderate size at one end of which was a raised dais, while seats ran round the room on the other three sides. This appeared to be a council chamber and in the middle on a rough stove stood an enormous copper kettle.

The No. 1 Lama was such a swell that he could not come and see us, but the second in command appeared in a few minutes and escorted us to the raised dais, he himself taking a lower place. Tea was provided with little plates containing 15 or 20 kinds of sweet-meats, raisins, etc., as well as some very rich cream cheese.

We were then obliged to drink three cups of "koumiss," the vilest liquor I have ever tasted, but which the Mongols drink like milk. In spite of my wish not to cause offence, I had the greatest difficulty in controlling my features, but we were made to understand that it was customary to drink three cups.

We had to speak through two interpreters, as the "boy" could not speak the Mongol tongue and Mr. Yang did not know a word of English.

These Lamas seemed really homely, pleasant people; they declined

to accept remuneration for their hospitality and offered to escort us over the Lamasery should we have time, but as it happened we were unable to do this during our short stay at Dolon-Nor.

We devoted one day to the antelope. Taking three mounted men with us, we set out towards a place where a herd was reported to have been seen by the natives and espied them on a side of a hill, on examining which, we perceived a deep gully running from top to bottom. We therefore made a detour of some miles and, having left our attendants with our horses, climbed the opposite side of the hill and entered the gully.

Creeping down this on hands and knees we contrived to get within 300 yards of some of the herd, who were still peacefully grazing, not having perceived us. T—— was successful with his Westley Richards ·303 in shooting a fine roe through the body. The remainder of the herd covered a few miles of ground with amazing rapidity. We brought in this dead beast on a pony and fed on venison for some way on our return journey!

Another day we rode out with Colonel Hoong and a fairly large retinue to a spot 20 miles from Dolon-Nor, where there was a herd of some 800 or 900 ponies. The Colonel was anxious that we should take our pick of three from the herd as a present, but *timeo Danos et dona ferentes*. We accepted one, making a suitable present in return. What was well worth seeing was the skill with which the Mongols caught the ponies for our inspection. They do not use an ordinary lasso, but a very long pole with a loop of hide at the end; this they cast over the pony's head and twist the pole rapidly till the pony finds it uncomfortable and pulls up! We had only to designate one of the crowd and a couple of Mongols chased it out of the herd, turning it at sharp angles, the rider then gets behind the saddle, drops the loop and the trained pony pulls up suddenly; round goes the pole and the frightened pony after a regular tug of war is captured.

A race meeting is no novelty to the Mongols; every year large races are held on the grass country, which I believe are largely attended by the Mongol kings and princes who still hold sway over these nomads. Consequently we were enabled to borrow flags to mark out a course which we chose about a mile from Dolon-Nor.

On the day fixed for our races we rode out on our hacks to this course, our other ponies and the mare being led out. About noon a large and motley crowd began to assemble, and what was curious about the spectators was the fact that nearly every man was mounted! It was indeed a strange sight; Chinese and Mongols in every description of coloured robes on ponies, mules, and even donkeys.

Colonel Hoong arrived on a beautiful mule with a staff of attendants and a few Shanghai horse-dealers.

We had brought one of our carts as "judge's box," and on this the judge stood. In spite of the contrast between the mare, who was in fine condition, and their shaggy coated ponies, the natives still thought that she would be beaten, and there were about ten entries for the first race against the "big horse." I have grave suspicions that Mr.

Yang's uncle was "making a book," as he appeared very busy with sheets of paper covered with Chinese hieroglyphics.

T—— having mounted the mare, we sallied forth to the start, I having armed myself with a flag as starter. The start was a good one though the mare hung back for a few seconds; she then went through the whole field and came in a good hundred yards ahead amidst the shouts of the astonished crowd, who at the close of the race thronged round to examine her. The other races were won by various Chinese or Mongols, one small boy carrying off a watch after a close finish on a white pony bare-backed. There were no penalties, scratch weights!

On starting our race I was unfortunate enough to leave two fierce-looking Mongols at the post, who eyed me with no little wrath in their faces. I however jumped on my pony and galloped into the midst of the spectators to give the heated jockeys time to cool their injured feelings!

There was really a keen interest shewn in the meeting by the spectators, who kept clear of the course, forming a line each side, although there were no rails, ropes or police.

Colonel Hoong presented the prizes after each race; at the close of the meeting a messenger came from the chief Lama of Dolon-Nor to the effect that he would like to see the "great English horse." We accordingly repaired to the Lamasery, where, after tea had been served to us outside, the High Priest made his appearance on a low balcony and asked us a few questions about the mare. As they had told me that this head Lama was a prophet, I told the interpreter to ask the old gentleman for the name of the winner of the Hong Kong Derby, but the interpreter appeared to be shocked at the idea and declined to put the question!

That night we entertained Colonel Hoong at dinner, our cook providing alternately English and Chinese dishes; and the Colonel's attempts to use a knife and fork were even more humourous than ours with chop-sticks.

A few days later we left Dolon-Nor and travelled back by the same route along which we had come. The journey back was without incident, except for two false alarms of brigands. We were passing through a scantily inhabited part, and having been repeatedly warned by the innkeepers, I had fastened my revolver to my saddle, besides carrying a rifle. We had let the carts go on ahead, and T—— and I were having long shots at antelope, when from the summit of a hill I spied eight or nine mounted men following in the track of our carts. They appeared to be armed and were proceeding at a canter. We mounted and were soon in hot pursuit. After a chase of a mile or two we came up with the party, only to find them to be a few soldiers travelling to the next village.

One night, too, we had retired to rest when the inn coolie came in quietly and, pointing to our rifles, put his finger to his mouth, and then pointed through the open door to a large room where several men were quartered. Fearing an attack on our sycee we loaded rifles, guns and revolvers, and then, trusting to the watch-dog, went to sleep; nothing, however, occurred.

On our arrival at Kalgan we found that the news of the mare's victory had somehow reached that place in two days from the date of the meeting; the news having travelled some 50 miles a day. This will show what a sensation the race meeting had caused among the natives, who practically live on horseback.

We arrived at Peking in good time for the races there, but we were a day out in our reckoning, reaching Peking on a Sunday, though we thought it was Monday.

Of the ponies we bought in Mongolia and took to Hong Kong I will not say much; they were on the whole not successful in the February meeting. However, we had accomplished our object of showing the Celestials that perhaps a little fresh blood would be useful in their breed of ponies; having also explored a part of the world little known to Europeans and had fair shooting.

Two months was a short space of time for the expedition; both on our journey to Dolon-Nor and on our return we were obliged to travel some 250 miles in ten consecutive days, 100 miles of it being on infamous roads.

Except for our one quarrel with an innkeeper, we were treated throughout our journey with much civility by the natives, whether or not this was due to the importance they attached to the fact of our having three carts I do not know, but we carried no fire-arms conspicuously, except when on the grass country of Mongolia.

Imperial horse pasturages
PEKING
TIENTSIN
PAO-TING
SUAN-HUA
YEN-KHING
PAO-AN
TCHANG-PHING
TCHÊNG-TÊ
Gulf of Pe-Chi-Li
Scale of Miles
R.F. = 1/1355000
20 15 10 5 0 20 40 60 80 Miles

ARTILLERY POSITIONS AND SCREENING GUNS.

BY

CAPTAIN C. D. GUINNESS, R.A.

Smokeless powder.

At last the British Artillery is re-armed with guns burning smokeless powder!

British artillery driving is unequalled.

Wherever dash is required and obstacles are to be surmounted, there is nothing to compare with our Royal Horse Artillery and Field batteries. In this respect we are a model to all foreign armies without exception.

Recently, at the New Forest manœuvres, the French military attaché, himself an artillery officer, repeatedly broke out in loud praises of the way in which our guns were manœuvred over rough country, at a pace and in a style which he declared to have been never attempted by his own artillery.

The appearance of fire discipline.

When, some eight years ago, we were apparently, to all purposes, hopelessly left behind by foreign artilleries in the practical solution of such gunnery questions as ranging and the direction and distribution of fire in the field, we suddenly gave up thinking entirely about mounted drill formations and evolutions and set to work with a will to elaborate our present system of fire discipline, which is admittedly as near perfection as possible. At first there was an outcry—the sporting subaltern who was all for the advance at the gallop and who, to use an old saw, "Would gladly return the guns in store and turn out as light cavalry," thought it a poor game having to attend day after day and hour after hour at battery gun-drill. He considered that his talents were being absolutely wasted when he had to become simply an automaton for passing down orders. Then again, think of the monotony of the perpetual examinations in laying of the unfortunate gunner. Hammer! Hammer!! Hammer!!! "Two degrees 38 minutes—9 minutes left." "Second dummy from the left—Lay." Of course, if the layer felt a bit chippy, he invariably layed with the Scott's sight on the second from the *right*—that is to say, the wrong dummy. Oh! if a fraction of the language and the imprecations which have been heaped on the devoted head of the inventor of this inverting telescope could only be written down! If the gunner is

The difficulty of getting men to lay correctly with Scott' sights.

apt to get stale with perpetual laying, what about his officer? Have there not been some cases of otherwise good regimental officers not being able to stand the monotony of the job?

However, our officers and men, thanks to the incentive of competition, have as a whole overcome all these difficulties. We now quite enjoy our long mornings at the laying, our men never (?) lay on the wrong dummy and the skilled layers hardly ever put on 1000 yards more on the sights than has been ordered by the battery commander. But, to speak seriously, we are now "past masters" of the art of "fire discipline" in all its branches. Can we rest on our oars and be satisfied? Is there nothing for us to learn and are we fit to face a continental artillery in the great gun duel which ushers in the modern battle?

The Artillery Duel.

The artillery duel.

Let us examine the conditions of the battle of the future. What is the first step? The artillery commander rides on and reconnoitres the position of the enemy. He knows he is *there or thereabouts*, because the cavalry scouts have told him so. But he cannot see the hostile artillery. Why? Because in the German and other armies the guns are concealed either behind the ridge or other cover, unlimbered and ready to be run up the moment our guns shall appear above the sky-line.[1] What is he to do? Being an Englishman our artillery commander decides to open the ball. He selects his position. He advances his batteries sufficiently forward to lay on the enemy's guns when they shall appear above the opposite crest; and he trusts that his majors will open fire first and that he will establish his superiority by sheer force of British pluck and endurance, if not by weight of metal. He may use the "direct" or the "deliberate" method of bringing up his guns. But in any event he feels sure that when the last signal to advance is given, no one battery will be much behind the other in the race for the crest and for the honour of the first shot. I think that most of our artillery officers would carry out some such method as this if placed in command of several batteries on service.

The artillery duel—The usual method.

I will now proceed to analyze these tactics in detail.

No doubt the advantage generally lies with the offensive. The enemy is expectant and quiescent. The exact time and place of the attack are unknown to him. Our men, on the other hand, are keen for the fray and the sharp sprint into action warms the blood. We are elated and we assume that the enemy will be unnerved by the long waiting and therefore unready. Let us look at the situation from the enemy's point of view for one moment. His cavalry are driven in. He sees the dust clouds of our advancing guns. In spite of all regulations to the contrary, colonels, adjutants, range-takers, majors and section commanders often appear one after the other preceding the advance of the batteries like the peacock, the jungle-fowl and the

The enemy's procedure.

[1] *Vide* page 46, January 1897, No. 1 of R.A.I. "Proceedings." In "A criticism by a German general officer" of Captain Pilcher's lecture on "Artillery from an infantry officers' point of view," it is laid down that "Only the muzzles of the guns should show above the crest."

monkey, which invariably "show up" before the tiger in a jungle beat.

He is at once on the "qui vive." He knows by experience that our artillery invariably comes into action on the *crest* or *immediately behind it on the reverse slope* and he takes his measures accordingly. Every tree, bush, or rock on the crest is marked down and the ranges to these objects are accurately measured beforehand. His guns are either run up; or, what is more likely with smokeless powder, they are unmasked; or perhaps they even open fire from the forward slope and shoot over or through their screen; whilst all the time our unfortunate majors, section commanders and layers are having an invisible target pointed out to them and are perfectly fogged as to the actual position of the enemy's guns and the distribution of fire required for each battery.

The difficulties of our artillery commander.

How, under these circumstances, are we to establish the superiority? I defy any man to range a battery if he cannot see the target. He is in a much worse case than if he failed to observe the burst of his shell, because he cannot open fire into space. Everyone who has examined layers knows how difficult it is to point out a particular target and to get each layer in a battery to "distribute" correctly. The enemy opens fire at once because he knows the range and sees each gun of ours standing up at 20 yards interval on the crest against the sky, "like quills upon the fretful porcupine." Consequently I make bold to assert that the odds are we shall get the worst of it in the first 10 minutes of the artillery duel.

I have attempted to depict our usual method of advancing into action. I have not gone into the merits of the "direct" or the "deliberate" occupation of the position. That is a matter of drill. But in nearly every case (except where the guns are run up by hand or when firing from behind cover with the aid of aiming posts) there is a final rapid advance by the batteries on to the position before unlimbering. During this movement the gun teams and detachment horses are fully exposed for a longer or shorter period, according to whether the forward slope, crest or reverse slope is to be occupied.

The Position on the Reverse Slope.

Reverse slope.

Let us first examine the reverse slope when employed as the site for an artillery position.

Exposure of detachments with B.L. and M.L. guns.

I think it was Major (now Major-General) Tyler[1] who first pointed out in the R.A.I. papers 10 years ago that the less the height of the axis of the piece above the ground the greater would be the exposure of the detachments. This is because when the axis of the gun is not far from the ground, the gunners would have to run up a great deal in order to enable the line of sight to clear the crest. Every inch taken off the height of the axis of the gun means that the gunners must be exposed for another inch of their height. Thus with a mountain gun we have the greatest exposure of the men.

The 7-pr. of 150 lbs. has the height of the trunnions, 1 ft. 10 in.

[1] "Shield or Shelter," by Major T. B. Tyler, R.H.A., "Proceedings" R.A.I., No. 11, Vol. XIV., 1886.

above the ground. The gunners (if standing up and 5 ft. 10 in. in height) would have at least 4 ft. of their bodies exposed above the ground, and therefore on the sky-line, if the gun was on the reverse slope and could just fire over the crest.

TABLE I.

Muzzle-loaders.[1]			
The 9-pr. on Mark II. carriage has height of trunnions	3′ 6½″,	giving exposure of men	2′ 3½″ + 3″ [1] = 2′ 6½″
" 13-pr. on Mark I.	"	"	2′ 3″ + 3″[1] = 2′ 6″
" 16-pr. on Mark I.	" 3′ 7½″	"	2′ 3½″ + 3″[1] = 2′ 6½″
Breech-loaders.			
The 12-pr. or 15-pr on. Mark I.	" 3′ 3½″,	"	2′ 6½″
" " Mark II.	" 3′ 4″,	"	2′ 6″

Consequently we arrive at the conclusion that in spite of the better cover given by the 12-pr. owing to its being a breech-loader, we have the same amount of height above the sky-line and therefore, exposure of detachment, as with the 9-pr., 13-pr. and 16-pr. muzzle-loading guns. This is because the 12-pr. has to be run up a vertical distance of 3 in. to 4 in. higher in order to clear the crest. The wheels in each case are the same height, consequently the further you run up the gun the more the wheels will appear out against the sky. I have often noticed that it is not the men serving the guns who attract the most attention, but it is the gun wheels, always inclined outwards at the same angle, which betray the presence of artillery on or behind a crest. The fact of the spare wheels, packed up on the wagons in rear of a line of guns, being so visible on the sky-line, has probably been one of the reasons which has caused them to be removed from their former position and carried elsewhere in the new 15-pr. equipment.

Gun wheels —*not* the detachment— which 'show up" on sky-line.

To return to our modern battle. The commander of the artillery may occasionally come into action on the crest or even beyond it; but I am bound to say that at almost every field-day our artillery officers are very chary of exposing more than the muzzles of their guns. If the reverse slope is at all feasible (say not exceeding 6 degrees) guns are *invariably* brought into action on that side.

Before proceeding to examine the reasons for and against each position, it would be well to note that each of the last three drill-books becomes more vague than its predecessor. No doubt it is best to leave officers a free hand in this and other respects. But it will be observed that under the heading "The choice of a position," the Field Artillery drill of 1889, Vol. II., page 209, gives instructions in full on this subject; then we come to the drill of 1893, page 156, in which the first three-quarters of a page of the 1889 book is cut out. Finally, we have our most recent copy of the drill-book of 1896. The instructions on page 12 are shorter still. What I want to know is :—"*What is the best artillery position?*"

Each drill-book gives shorter instructions as to choice of positions.

It always appears to me that a battery on the reverse slope violates the first condition, which is as follows :—

"*A clear view over the sights* of the target, and of all ground on to which it is probable fire may have to be turned, is the most im-

[1] For muzzle-loaders we should add 3 inches for the numbers in line with the front of the wheel if reverse slope were about 5 degrees.

portant requirements of a good position." How can all the ground in front be seen if the muzzles are only just showing over the ridge ? "

Supposed advantages of reverse slope.

The reasons generally given in favour of the reverse slope are the following :—

(1) Concealment.

(2) Cover for the gun detachments and those in rear.

(3) Easy to limber up unseen by the enemy.

(4) Wagons can be brought up unseen and under cover.

(5) Guns are less easy to range on. Bursts " over " are hard to judge.

ARGUMENTS IN FAVOUR OF REVERSE SLOPE ANALYSED.

(1).—*Concealment.*

Lord Wolseley on 'the question of concealment.'

Lord Wolseley in a memorandum on practice at Glenbeigh, dated 16th August, 1891, says :—

(*See* Annual report Horse and Field Artillery Practice, 1895 :—)

" The importance of preserving the horses of a battery from the effect of modern fire does not appear to receive the attention it deserves.

The introduction of smokeless powder points to " concealment " as the best method of protecting our batteries from losses both in men and horses.

Where time and ground and the tactical requirements of the action permit, batteries could be brought into action under cover, and then placed in position by hand. Sudden effects of fire could then be produced without exposure of *personnel* or horses. Indirect laying could be employed against stationary targets, whilst, if the question of background is studied as it should be, the target presented to the enemy should be a very difficult one."

. . . . . .

Lord Roberts on artillery tactics at the German manœuvres.

In a Report of Military Society of Ireland, dated 1st April, 1896. Lord Roberts said—

" In the first place let me say how glad I am to find an infantry officer taking such an intelligent interest in artillery and showing, as Captain Pilcher has shown, that there is no mystery connected with artillery subjects which cannot be solved by any outsider who will take the trouble to master them. Captain Pilcher brought forward many important points which his recent visit to Germany has impressed upon him, and one of the most important, perhaps, is the one which he first mentioned, namely, the study of the ground. Now, during my visit to Germany, I was at Stettin last September, where I had the privilege of attending the annual manœuvres, and I was as much struck as Captain Pilcher seems to have been at the attention paid to this important subject by artillery commanders, and by the intelligent

manner in which they brought their guns into action. Every advantage was taken of the ground, every care was taken to concentrate the fire, and I observed, on more than one occasion, a few batteries being pushed well to the front, just as the assault was about to be delivered. I quite understand what has been remarked by Colonel Hutchinson that, under ordinary circumstances, one would not put artillery further to the front than could be avoided; but, as Captain Pilcher said just now, if they can continue to fire, we will say at a range of 1,500 yards, while the infantry are advancing close to the point of attack, it would be useless in their moving from their position, because, of course, a gun cannot be less effective than it would be in a much nearer position. But it often happens that if artillery cannot get well to the flank, or to some commanding position from which they can see the enemy, while their own infantry are approaching nearer, they must cease firing, or they must come to some point nearer to the front so as to help their infantry. I noticed this particularly with the Germans, and it struck me as being extremely valuable as an aid to infantry at a very critical time. But I confess I am disposed to endorse the opinion expressed by Major, now Lieutenant-Colonel, Sir George Clarke, R.E., and published a few years ago in the "Proceedings" of the Royal Artillery Institution."

. . . . . .

Sir George Clarke on the effects of time shrapnel.

Writing on the deadly effects of time shrapnel, Major Clarke referred to it as follows:—

"If, in the next great war, the gun does not amply illustrate its man-killing power, the reason can only be that it was not properly handled. A most disastrous surprise awaits the force which finds itself face to face with an enemy whose gunners possess a superiority in knowledge and training."

. . . . . .

Captain Pilcher on "the study of ground."

Captain Pilcher said—

"The importance of a study of ground and a correct appreciation of its tactical uses was very great. There should be an eye for a country in a sporting and in a military sense; not alternatives, nor yet the same thing. The German artillery showed great skill in concealing its position, and all the artillery forts opened fire at the same time, because if one battery began to fire on its own account it might bring the united assault of the enemy upon it, and thus be annihilated."

. . . . . .

The solid bank in front of guns on reverse slope

I have shown above (*see* Table I.) that the exposure of the men serving all field-guns—breech or muzzle-loaders—is about the same; but that with guns having their axis very near the ground, the wheels more clearly indicate the position of guns on the rear slope. It is evident that when guns are in action on the rear slope, the ridge in front of the 15-pr. Mark II. carriage must not exceed 3 ft. 4 in. in height; and it is also clear that a gunner 5 ft. 10 in. high is not so exposed nor is he so visible as if he were on the crest, because only

2 ft. 6 in. of him, viz., his head and shoulders, show above the ridge. But of what use is concealment if a solid bank, 3 ft. 4 in. in height and of varying width, prevents your seeing ground to the front and at a lower level than the original target against which you opened fire?

Entailing risk of capture by cavalry.

What about the risk of being captured by cavalry? Do you think you are secure in this respect whilst you are pounding away against the opposite guns? Artillery are constantly impressed with the statement that their own fire is ample security against a frontal attack. Is this true when you hide your guns and detachments behind the ridge?

Good view is the first requisite.

No. The first principle for the selection of a position is a good view all over the ground in your immediate front. This is not to be attained in a hilly country by putting an obstruction between you and the enemy in the valley. For an example, turn to the plate to fig. 4 again. If General B were to put his gun at A′ down the reverse slope, instead of at A, then the gunners on either side of A′ and E would only see each others' muzzles and none of the intervening ground.

The same argument applies to the hostile infantry.

After artillery duel guns have to be "run up" to fire at advancing infantry.

You cannot see them during the artillery duel if you are behind the hill. They, like the cavalry, come on you unawares and you have to "run up"—how far depends *first* on the vertical depth of their position below you; and *secondly* on their proximity. If they are a long way off, on the further side of the valley, an order to run up a few yards will reveal them to you; but if they have crossed the stream at the bottom and are right under you, you may have to move the guns forward a considerable distance over the crest before you can see them; and then just think what a splendid mark your gunners will be for the infantry magazine fire when they stand out on the bare hill side against the sky!

On the other hand, when on the reverse slope, it is undoubted that the enemy will not be able:—

(*a*) To discover your movements.

(*b*) To judge the effect of his shell.

(*c*) To see the position of your limbers, wagons, etc.

Guns must support infantry attack throughout.

These are no doubt of great advantage to you, but are they in accordance with the spirit of the attack?

Also what does your own advanced infantry think about it? They may be below you or on both flanks, waiting for a favourable opportunity to advance in face of a withering fire.

If you are behind the hill they will *hear* each discharge of your guns, but they will not *see* them. What would encourage them much more would be to *see* them close by in the same line! "Shoulder to shoulder!" "Seeing is believing!" "Confidence begets confidence!"

The question of cover for gunners.

(2).—*Cover for the gun detachments and those in rear.*

This question has been fully dealt with on pages 63 and 64.

I propose to show later on under the heading of "trajectories" and "cones of dispersion of shrapnel shell" that the reserve troops and

limbers and wagons in rear of the crest are in greater peril than if they were standing out in the open on the exposed side of the hill.

Extra work in "running up" the gun after firing.

[1] "A battery would be compelled to fight it out in the open simply to avoid the physical fatigue to the men of running the guns up into position on a steep hill side. This point generally escapes the attention of the manœuvre ground umpire, when blank ammunition only is consumed, but those who have seen the *absolute physical prostration* which can ensue among a gun detachment in a long-contested action will not be disposed to underrate its value. A man who has once seen his gun numbers fall asleep under a heavy fire and had to drag them out of the way of the recoiling wheels, carries away with him an impression that time cannot efface; and if in peace-time, *in deference to an umpire's opinion*, he fights his guns in an impossible position, he will generally, in the security of his club or ante-room, express his opinion of that umpire's capacity with anything but respect."

(3).—*Easy to limber up unseen by the enemy.*

Guns on reverse slope seldom run back before "limbering up."

This would be the case if guns were invariably run back a long way behind the crest before limbering up. But as a matter of fact when it is required to advance, the trail is thrown round on the ground the gun stands on and the limbers are brought up right against the sky, on the order "Front limber up." Previous to limbering up we start by having the gunners exposed [1] (*see* Table I.) for 2 ft. 6 in. of their height in action. The limber comes forward in front of the gun. The gunners mount; their heads are then 8 to 9 ft. above the ground. Add to this each pair of horses and we get a very large target for infantry or artillery fire showing out against the sky and perfectly visible to everybody. Consequently there is not much difference in favour of the reverse slope position as far as this head is concerned. Turn to the plate once more. At D, General W has a gun in action on the reverse slope—he wishes to limber up preparatory to advancing. The gun should be first run back considerably. This is not done as a rule, and when the gun team comes up with the limber, the whole movement and intention are exposed to view against the sky.

(4).—*Wagons can be brought up unseen and under cover.*

"Wagon supply."

My answer to this is that in many cases the wagons "show up" if the reverse slope is very gentle; also that it is a mistake to suppose that a line of wagons, 40 yards apart, advancing at a rapid pace to the guns on the forward slope, forms an easy target.

(5).—*Guns are less easy to range on and bursts 'over' are hard to judge.*

"Ranging" of enemy more difficult.

True. But the enemy can still clearly see the detachments and the gun-wheels for half their height against the sky. In the case of "the Bluff" on No. 2 range at Okehampton, it is not so much because the bursts "over" are so hard to see that the guns in this position are so invulnerable; but it is because there is an underfeature just in front

[1] Vide *Army and Navy Gazette* leader of 25th April, 1896.

of them, having a hollow in rear of it. The shells bursting "short" fall into this depression and the smoke in rising becomes attenuated; the guns on "the Bluff" then appear to stand out *in front of* the smoke instead of *behind it*. On the other hand, in ranging on guns on the crest or the reverse slope, if the battery commander does *not* see his first shell strike or burst, he knows at once that that shell is over. He takes measures accordingly to pull down the elevation considerably for the next round.

The Position on the Crest.

The position on the crest.

Nearly all I have said about the reverse slope and the exposure of the gunners, applies with redoubled force when we come to put the guns on the crest.

Here "sky-line" comes in with a vengeance. The whole of the men and the unmistakable form of the gun-carriage shows up with exaggerated clearness.

It is of no use repeating the arguments already used against the reverse slope position.

I will only quote two instances to show what I mean—one from the pen of a Crimean warrior, the other from the most recent tactical artillery field-day which took place this very day at Aldershot.

Example I.—'C' troop in the Crimea.

(1.)—Extract from a letter of General the Hon. Sir David Fraser, K.C.B., R.H.A.:—

The Grange,

Castleconnell, Co. Limerick.

16th July, 1896.

"As to the comparative effect of the occupation of the crest or forward slope of a hill for a battery of artillery, I can only give you the following instance as told me in the year 1856, by Lieut.-Colonel H. J. Thomas, R.A.

In October, 1855, Colonel, then Captain, Thomas, commanded 'C' troop R.H.A., which was employed at Eupatoria with a French force, under General D'Allonville. He said:—

'We were ordered forward with a French troop against the Russians who had advanced. On ascending a hill we saw their artillery in action and the French troop at once unlimbered on the top of the hill. I did not like stopping on a sky-line, so I galloped a good bit down the sloping hill, came into action and soon got the range of the Russians; the Russians never got our range properly and I had very little loss; but the French troop lost heavily from being on the top of the hill.'"

[1] "The Rev. H. Hulecatt, who as chaplain accompanied the troop and was in the same action, gives a spirited account of an engagement which took place at Chobotar, where the troop greatly distinguished itself by a brilliant advance upon the Russian position, thus getting under the line of fire of some heavy guns; and after doing great

[1] This event is mentioned in records of the Royal Horse Artillery, by the late Major-General John Michell. *See* page 10. Revised Edition of 1888.

execution on their columns, retired with but trifling loss, while the French and Turkish batteries, which had remained on the rising ground behind, suffered severely."

"My own (Sir David Fraser's) opinion is that in most cases a good background is the great point, and if the forward slope has some scattered bushes on it, among which the guns could be placed, it would make a good position for an attacking battery, so far as effect of fire was concerned, either for inflicting or promoting loss."

Example II.—Artillery tactical day at Aldershot in 1896.

(2).—To-day's (21. 8. 96.) tactical field-day at Aldershot. Three Brigade Divisions Field Artillery, Southern Force, against one of R.H.A. and 2 Brigade Divisions Field Artillery, Northern Force.

At the conference it was pointed out that several batteries came into action on Jubilee Hill and Burns Hill in a position to open fire on the advancing batteries when these should appear on Brock's Hill or Tweseldown.

There was no enemy to fire at, but the guns of the Southern Force were placed there to receive him with a concentrated fire at a measured range on his first appearance.

These guns of the Southern Force were visible to the advancing R.H.A. brigade division and disclosed their position even before they opened fire.

This disposition of the Southern Artillery was criticised. It was admitted by the Southern Artillery commander that it would have been better to have unlimbered the guns just behind the crest and have run them up by hand on the appearance of the enemy.

Can you always unlimber and run up by hand?

But the Southern reverse slope of Jubilee Hill was so steep that the guns were brought up on its crest with the greatest difficulty. Would it have been really possible to have unlimbered on the reverse slope in this case?

Now just suppose for one moment that these Southern batteries had been burning smokeless powder and that it had been possible to screen them artificially on this crest in some way during the long period before the expected advent of the Northerners. Would this prepared position have been a faulty one? I think not. First, because there was a good solid background in the shape of the heights of Hungry Hill in rear; and, secondly, because it would have been impossible for the Northern Artillery commander to see these guns firing smokeless powder 2,200 to 2,600 yards away with every advantage of command and favourable background on their side.

Question of background.

On the other hand, had these Southern guns been standing up against the sky on the top of Bricksbury Hill, as they were two days previously, their every movement would have been visible.

Why not practise at guns on reverse slope?

I often wonder why we do not practise more frequently at guns placed out of sight on the reverse slope just behind the crest. Nine years ago, when an endeavour was being made to obtain a good land range for artillery in Ireland, I suggested that one could be found in the Wicklow mountains instead of going to Glenbeigh, where the position of your target and the position of your battery are fixed and

on the sea-level. I examined the south-west corner of Wicklow and proposed the Glen of Imaal, where the Slaney has its source, and another valley to the south of it, as forming ideal ranges. Targets can be placed on the front crest and reverse slope of the hills; so can the batteries, and every variation of plunging or upward fire can be employed. I am glad to say that there is now a good chance of this site being acquired (*vide* Annual Report on practice just issued). Proposed Irish land range.

The Position on the Forward Slope.

The British 15-pr. gun, on its present carriage of Mark II. pattern, cannot fire up hill at long ranges when on the forward slope. The position on the forward slope.

To do any damage to an enemy above you, you must withdraw your gun either to the crest or to the reverse slope.

The maximum elevation which the Mark II. 15-pr. carriage is capable of giving to the gun is only 14 degrees 20 minutes on level ground, as measured by me with the clinometer in the barrack square. The newest hand-book gives this as 16° for Mark I. and II. carriages (*see* p. 16 of 15-pr. hand-book of 1896). But later on (*see* p. 84) the maximum elevation, as given at foot of range table, is 14° 36′ for 5500 yards. Latest carriages allow of insufficient elevation.

To find out what is the maximum height at different ranges which the shell can attain when the gun is on a forward slope of 5°, I have prepared the accompanying section. *See* Fig. 5. I proceed as follows:—

If I am firing from a position on a forward slope of 5° = 1 in 11, I must, of course, deduct this 5° from the maximum quadrant elevation, which the Mark II. carriage is capable of giving to the gun when on the level. Thus:— Especially on the forward slope.

Maximum elevation is ...	...	14° 20′
Deduct forward slope of	...	5° 0′
And I get the corrected maximum elevation...		9° 20′

I can then find the height at any range. Take, for instance, a range of 3,500 yards. Can I fire at an object 600 ft. above me? *First*, draw a line to scale to represent 3,500 yards on the level. Erect a perpendicular, measuring 600 ft. at one end of the line, join the top with the firing point at the other end of the line. Example of 15-pr. on Mark II. carriage.

Measure the angle of sight on the section of the triangle so found.

This is found to be 2° 10′.

Deduct this from 9° 20′, the corrected maximum elevation for a forward slope of 5°, and we get:—

Corrected maximum elevation is ...	...	9° 20′
Deduct angle of sight	...	2° 10′
And we have an elevation of		7° 10′

But 7° 10′ is the elevation for 3,575 yards with the 15-pr. on Mark II. carriage.

Therefore, we find that the shell will reach an object 600 ft. above the gun and 3,500 yards off.

If the range arrived at as above were less than 3,500 yards, it would show that the shell would not carry as high as 600 ft.

I have worked the whole thing out with a gun in the field and also on paper, and I find the two agree.

On looking at my section (Fig. 5) you will perceive that the table of heights falls rapidly between 3,000 and 4,000 yards, from 750 ft. to about 150 ft.

This defect would not be so bad in the Mark I. carriage which has a maximum elevation of 15° 45′, as measured by me with a clinometer.

It would be non-existent in the old 9-pr. with a maximum elevation of 22°.

On forward slope at long ranges holes must be dug in the ground.

It would be fatal if a brigade division or a larger force of 15-pr. (Mark II. carriage) guns were ever to be brought into action on a forward slope of 5° against a mass of guns occupying a position with a command exceeding 300 ft. at a long range of 3,750 yards, or 750 ft. at 3000 yards. The guns could not be fired and the men would be swept away whilst attempting to dig holes for the trails. Each new carriage is worse in this respect than its predecessor.

With a 15-pr. gun, in the battery to which I belong, firing on a forward slope of 5° on Mark II. carriage, the maximum range is only 4,100 yards when the gun and target are on the same level. When the carriage stands on level ground and the gun and target are on the same level, the maximum elevation is only 5,100 yards, as I measured it—latest hand-book says 5,500 yards.

Fear of umpires decisions.

One reason why artillery come into action on the reverse slope for choice is because umpires are instructed to note the "visibility or otherwise of the guns, the choice of position as regards effective fire action and cover, and the difficulty for the enemy to observing the effect of his fire." (*See* p. 261, Part X. Infantry Drill, 1896.)

In other words, officers commanding mounted batteries get into the way of thinking that the only place where they will escape criticism is behind a piece of rising ground.

Naturally they would select the crest, and when driven off that by fear of the umpire ruling, they take refuge behind it, never thinking to make a bold advance to the lower ground in front of it.

Germans in 1870-71 in forward slope.

In 1870-71 the Germans almost invariably had to come into action low down on the forward slopes, so as to be able to bring all their batteries into action. (*Vide* Colonel Maurice's lecture, Artillery in 1870-71 and quotations therefrom later on in this paper.)

There are many things we do now which we doubtless would omit on service.

Objections to Scott's sight on service.

For instance, there is Scott's sight. Major W. N. LLoyd (who recently left the Regiment, after having pulled off the top score at Competitive Practice three years in succession) told me the other day that he attributed his success to the way he trained his layers to use Scott's sight. By so doing the personal error or the nerves of the gun-layers were partly eliminated and the men acted mechanically when setting their sights. On the other hand, if he had to go on service, he said he would never attempt to use "Scott's sight," because

there are too many things to think of in connection with it. A man's whole mind must be intently fixed on the one definite aim or object. If he has to think of inverted images, deflection, etc, he would be bound to go wrong.

The target is well known in the Competitive and he knows what to look for through the telescope, but it would be otherwise on service.

Objection to the crest.

Again, the usual position of guns on the crest might be considerably modified when opposed to rifle fire and real bullets.

Objection to "limber supply."

Also the position of the horses at "limber supply" might be reconsidered if the battery is ever intended to move again.

An ideal position.

My ideal position for defence would be a railway cutting in front of and below a hog's back. The guns could be first run up over the lower bank of the cutting. They would not be on the sky-line, as the ridge or hog's back would be behind them. They might be screened. The limbers would be concealed from view, although not altogether from fire.

When the enemy's infantry arrive within effective rifle fire the guns could be run back, the limbers brought up and the battery withdrawn unseen by the enemy and round an underfeature or traverse.

If the detachments knew that there was a means of retreat open to them at the last extremity, they would fight all the better in the critical stages of the enemy's attack.

Hard to get

On the other hand, it is scarcely, if ever, possible to get such a position for guns. Every case has to be decided at once by the artillery commander according to his lights.

Supposed Disadvantages of the Forward Slope Position.

Supposed disadvantages of forward slope discussed.

(X.) Guns exposed to view of enemy in the advance into action, and (Y) wagons exposed when replenishing ammunition; (Z) limbers and teams very exposed when "supplying from limbers."

If we discuss X, Y and Z we find that when the guns advance from the 1st artillery position, there will always be an advancing infantry in front of them.

Surely if the infantry are advancing under fire, there is every reason for artillery to draw off some of the enemy's attention; and nothing presents so tempting a target to a gunner as a battery on the move.

All the hand-books lay down that artillery should try and take some of the intensity of the enemy's fire to itself during the successive advances of the infantry.

If this is the rule for the movement of the artillery when the infantry ranges are "long" (1500 to 800 yards, ["infantry" long-range rifle]), why should not the guns come into action at "distant" artillery ranges (1,500 to 3,000 yards) on the forward slopes when their movements will not be so apparent to the enemy?

See Lord Wolseley's remarks (in the annual report on Service Practice of 1895) *re study of background* (previously quoted); also Colonel Maurice's lecture in Dublin, *Artillery in 1870 and 1871*, dated 15th Nov., 1892; also old hand-book of Field Artillery drill of 1893, p. 157, about screening guns.

The Position of the Forward Slope.

The great point to my mind about the choice of the forward position in the attack is :—

The element of dash.

The element of DASH.

I have already tried to show that what strikes terror into the enemy and what encourages our own side is *dash*.

Bold advance over crest advocated.

To go back to our typical artillery duel; if our artillery commander, instead of hanging back, makes a bold advance of his whole line of batteries into a favourable position from which he can clearly see the enemy and open an effective fire from each battery at the same moment, he will have established himself so much nearer to the ultimate goal, *i.e.*, the enemy's position.

Not so easy to hit rapidly moving bodies of horses.

You say at once, "Oh! but you will be decimated in your rapid advance down the gently sloping ridge into the zone of the enemy's fire."

Apparently not. The cavalry drill-book says that bodies of cavalry are very vulnerable when halted or at a walk. The inference is that when trotting or galloping the extent of ground covered (250 and 350 yards a minute respectively) is so great that neither infantry nor gun fire has much effect even on large masses of mounted troops.

No doubt to quote an old saying, "A stray shot may kill the d——l," but then we must chance that.

Consequently I arrive at my principal contention, namely, that galloping teams of Horse and Field Artillery advancing in line into action at 20 yards interval, from distant (3500 yards) to medium (2500 yards) artillery ranges, are very difficult if not impossible to hit.

When the time comes for "Halt, action front," *then* is the real danger; but even then the teams are on the move, and with a smart battery it does not take so very long to clear away all horses from the line of guns and to open fire. All the batteries at Okehampton in 1893 and 1895 took on the average just one miunte to open fire; but we must remember that the limbers would be clear away long before the first gun. The ground is bad enough there in all conscience!

Precautions before advancing on to the forward slope.

The following precautions however must be taken before advancing boldly into action on the forward slope.

1. (*a.*) The first is that the ground in front must be thoroughly searched by our own cavalry. If infantry fire from concealed positions is to be feared, it is essential that a swarm of skirmishers (probably taken from the mounted infantry who could be rapidly pushed forward) should precede the advance of the guns, otherwise our gunners are liable to be picked off within the first few minutes of their coming into action.

C.O. should ride forward and look back to study background.

2. (*b.*) Secondly, the artillery commander must himself personally ride forward and with the help of several staff officers thoroughly examine the enemy's dispositions.

He should fix the position for his line of guns; and *then* he must *ride still more to the front* and consider what

the effect will be from the enemy's point of view. Will his guns be hidden or exposed? By moving them a little further forward or back perhaps the background might deceive the enemy as to their exact position. There may be a slight rise or hillock which would make all the difference in the world. This can only be seen from the front.

It may be said that the commander runs the risk of being captured. Well! if he should be, it is better so than to lose the batteries. Besides this is hardly likely to occur when he is preceded by his cavalry or mounted infantry escorts.

Again, it will be of great advantage to him to know exactly what is in front of him and the lay of the ground in view of a further advance later on in the day. This further reconnaissance by the artillery commander may deceive the enemy as to the exact position he intends to take up.

I have read somewhere that German artillery officers are invariably placed on the flanks and in front of the batteries in action to give timely notice of the enemy's approach.

Unfortunately we have none to spare in our service—not even for adjutant's work or for orderly officers to the Lieut.-Cols. commanding our brigade divisions—without robbing the batteries.

Trajectories.

Trajectories.

I have gone to some trouble to work out and put on paper the trajectories of the 12-pr. British and the German theoretical "gun of the future" of Major-General Rohne (on plate, Figs. 1, 2 and 3.) I have just obtained that of the 15-pr. since writing this paper. The weight of the shell is now finally settled at 14 lb. 1 oz. I have added it in blue to Fig. 3. The Lee-Metford trajectory is also given.

Drawn on scale of 6 in. to 1 mile useful after field-day.

My object in drawing these on a scale of 6 in. to 1 mile, is to enable any officer, who really wishes to do so, to prove for himself whether the best artillery position against infantry or guns was taken up at a field-day. He has only to gum this drawing of a trajectory (*vide* Fig. 3) on to a piece of card-board or wood and then he can cut it out and hang it up in his quarters or office against the wall. I would recommend the German trajectory (Fig. 2) to be also retained, as it gives the angle of opening for their proposed gun at each range. This is different and the bullets are more searching than in our service. By drawing a section of the ground from the 6-inch map on his return to barracks, he can easily see whether his fire would have passed over the force opposed to him; and he can also measure the effect which live shell would have produced if fired from or at objects behind a ridge.

Example from the New Forest manœuvres.

It should be observed in Fig. 4, showing a typical piece of ground in the New Forest, that in the upper section heights are to distances as 5 to 1, so as to show the features of the ground. This apparently

makes the trajectory much less searching than it really is. In the lower section the drawing is correct, but everything appears flat. As a matter of fact, all reverse slopes on which a limber can stand are searched throughout by artillery fire at ranges over 2,000 yards.

Useful when selecting ground for ranges.

Trajectories are most useful things to study, as I recently was able to show that a shell fired on a proposed artillery range would go clean into an old lady's house. If the gun were to be fired on the level, she would probably be in safety; but the fact of pointing a high velocity gun up-hill increases the range. Many people imagine that a high mountain will stop a shell. This is quite a mistake when firing up hill. Witness the "Hay" ranges and others which have had to be abandoned when 12-pr. and 13-pr. guns were used for practice. No. 1 range at Okehampton is none too safe in this respect.

Exposure of horses in action.

Exposure of Horses.

I have measured the square space taken up by :—

(1.) A Battery of Horse or Field Artillery in action, "wagon supply;" Fig. 8.

(2.) A Field battery "limber supply;" Fig. 9.

(3.) A Horse battery "limber supply;" Fig. 10.

I have graphically depicted the exposure of each in different colours, but all on the same scale.

Anyone can see at a glance that there is the greatest possible difference in the amount of exposure in each case.

It must be remembered that I have rather underestimated than overestimated the exposure of the horses, because I have taken a horse as being exactly facing the enemy. If the animal were "sideways on," the space occupied would be doubled and we should get two square yards instead of one as the exposure of each horse.

Horses at "limber supply" in great danger

Who is to say that horses when shell are bursting among them during "limber supply" are not going to kick or plunge and face in every direction but the right one? Nay rather. I GO FURTHER AND ASSERT THAT NO BATTERY COMMANDER IN REAL WARFARE WILL ATTEMPT TO FIGHT HIS GUNS IN THE OPEN WITH HIS GUN TEAMS HOOKED INTO THE LIMBERS AND HIS DETACHMENT HORSES CLOSE BY, IN THE PRESENT POSITION LAID DOWN FOR 'LIMBER SUPPLY.'

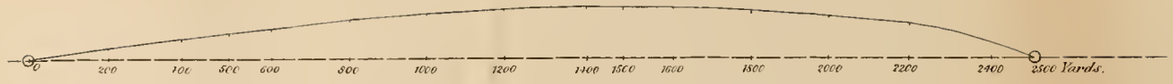
Proposal to leave trays of ammunition at the guns.

"Wagon supply" should always be adopted with the very rarest exceptions. It is the duty of the Captains to see that the wagons *are* up with the guns. If he cannot get his wagons up in time, the Battery Commander will either have to unhook his horses; or, better still, we shall have a fresh pattern of limber with trays containing so many shell and cartridges each; these trays will be secured by a clip or a knob, on pressing which the trays will be drawn out and left on the ground in rear of the guns.

The limbers could then be moved at a walk to the rear and placed behind a ridge, well out of the trajectory of the enemy's guns and rifle fire aimed at our batteries.

Horses should be placed out of the trajectory behind the ridge.

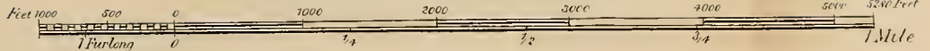
By proceeding at a walk to the rear, the limbers would draw off some of the fire from their own guns; and at the same time would themselves be less vulnerable than when halted close up to them.



Cordite Trajectory of the .303 Lee-Metford Rifle. M.V. 2000 F.S.

Fig. 1.

Scale:–Six Inches to One Statute Mile.



Scale for Figs. 1, 2, 3, 4 and 5.

When either in rear of the crest or 200 to 300 yards away, the limbers could then have fresh trays and horses supplied to them from the wagons when the latter came up.

As to there being a delay in limbering up, which system is the most likely to cause it?

Result in each case.

(1.) A rapid advance of the limbers to the line of guns at a trot or hand gallop, over say 300 yards of ground in exactly one minute on the signal from the commanding officer?

(2.) Or a mangled screaming mass of men and horses struggling to get free? In this case the squealing of the horses and the shouts of the drivers in their attempts to disentangle the dead from the living, would considerably interfere with the fire discipline of the battery.

One great advantage all troops on the move forward have, over those halted, is that the former leave their dead and wounded behind them out of sight.

Confusion during "limber supply."

But with "limber supply" we have all the hideous din and confusion of the plunging horses quite close to the guns in action. To say the least of it, this is demoralising, and will in any case distract the gun-layers and cause them to make mistakes in setting their sights and laying with them.

Frightful losses in horseflesh.

We have all of us heard of the "cat with nine lives;" but oddly enough (*vide* Colonel Walford's translation of General Rohne's book) a man's exposure standing is about half that of a horse "end on" and a quarter of that of a horse standing sideways. Consequently we may calculate on it being four times as hard to kill a man standing as a horse with his flank exposed. But [1] Captain Crampton says that 18 out of 24 horses were hit in 1 minute by 180 infantry at 1000 yards! Also that 12 horses were hit out of 24, and only one man out of 18 at 1200 yards in one minute by 94 infantry. In each case the horses represented gun teams at "limber supply." At a mean range of 1250 yards the percentage of target destroyed per 100 rifles firing for one minute was men 3·1, *horses* 32·0. The deduction to be made from this is that horses suffer losses compared to men in almost geometrical progression. If this be true, the man has nine lives more than the horse—and one to spare after that!

Examples of great loss of horses in action:—

Example I. —Waterloo.

(1.) Captain Mercer's (old) 'G' troop at Waterloo lost one-third of his men and 140 out of 200 of his horses, *i.e.*, *three-quarters of his horses.*

This was in the days of round shot.

Example II. —Borny.

(2.) Colonel C. B. Brackenbury, R.A., in a lecture delivered in April, 1876, at the United Service Institution, on "The Tactical Power of Modern Artillery," said:—

"At the battle of Borny, one German battery lost 4 officers, 42 men *and 50 horses, i.e.*, about three fourths of its officers and men *and more than its complement of horses.*"

[1] *See* R.A.I. "Proceedings," Vol. XXIII, No. 5, "Artillery and musketry fire," by Captain P. J. R. Crampton, R.A.

Example III.—Gravelotte.

(3.) "Again at Gravelotte, one battery lost *all the horses but 8* when surprised by infantry at close quarters."

All this occurred before the introduction of time shrapnel.

The effects of fire increase in geometric progression with the massing of the items forming the target.

As an illustration of how the deadly effects of fire increase in geometrical progression with the agglomeration of living units comprising the target, I ask you to tear up a large sheet of paper into little bits and to scatter them from some considerable height. Next take an india-rubber ball, dip it in water and throw it into the midst of the paper fragments.

Very few pieces of paper will be found to have adhered to the ball.

Experiment with scattered pieces of paper.

Now sweep up the bits and drop them once more, but from a lesser height. Take another shot with the wet ball. You will find that a greatly increased number of pieces have stuck to it.

In the first experiment it is very difficult to fix the eye on any particular portion of the littered floor. In the second aim at the thickest portion is an easy matter.

Similarly, it is very difficult to point out and to lay a gun on a particular portion of a scattered force of men or horses, whereas when these are collected behind the guns in action and close to each other in the form of gun teams and detachment horses with their horse holders at "limber supply," *then* I say that very little skill is required to sweep away the whole mass with a few well directed shrapnel.

Cones of Dispersion of Shrapnel Shell.

From Colonel Walford's translation of Major-General Rohne's "Shrapnel fire of the Field Artillery," we get the angle of opening of the German and French shell.

See Appendix II. Page 80 of the translation.

Table II.

German and French cones of dispersion greater than ours.

Metres.	Equivalent in yards.	Angle of opening 1873 pattern experimental German heavy field-gun 3·15″	Angle of opening French 3·54″ obus à mitraille.	Angle of opening German shrapnel, 1882 pattern. 3·08″ (?)	Angle of opening German 1891 pattern. 3·08″
500	546	7° 37′	16° 15′	15° 48′	15° 52′
1000	1093	8° 26′	18° 7′	17° 45′	18° 7′
1500	1640	9° 7′	19° 37′	19° 22′	19° 52′
2000	2187	9° 45′	21° 7′	20° 52′	21° 30′
2500	2734	10° 23′	22° 15′	22° 26′	23° 7′
3000	3280	11° 0′	23° 15′	24° 0′	24° 37′
3500	3827	11° 41′	24° 15′	25° 37′	26° 3′
		Base burster.	Head burster.	Central burster.	C'ntl. burst?
4000	4374				27° 30′
4500	4921				28° 52′
		Variation 8° to 12°	Variation 16° to 24°	Variation 15° to 25°	Variation 16° to 49°.

Angle of opening.

The 12-pr. English, with base burster, is 8° to 12° (practice shell-cast.)
The 12-pr. " with head " is 12° to 18° (service shell-steel.)
The 15-pr. Mark I. and II. shrapnel each have a base burster and angle of opening is from [8° to 12°.

From this it will be seen that the cone of dispersion (or angle of opening) of the present German and French shell is greater than that of our 12-pr. The trajectory of the present German gun is more curved than our 12-pr. This will increase the searching effects of their shell in comparison to ours if opposed to our troops. On the other hand, their "gun of the future" has its trajectory almost coinciding with that of our 12-pr. (*see* Fig. 3) ; but this is again counterbalanced by the trajectory of our 15-pr. being more curved than that of our 12-pr., or even than their "gun of the future."

Result: greater searching effects of foreign shrapnel.

Accordingly our 15-pr. is as nearly as possible the "beau ideal" of Major-General Rohne.

Page 63, Vol. II. Field Artillery Drill, 1889, gives 8° as the angle of opening of the shell after burst. Again, the "angle of descent of the 12-pr. B.L. at 2,900 yards is 7° 29′ ; and of the lower part of the cone the angle of descent would be not less than 15° ; consequently few, if any, of the balls would ricochet."

The effects of ricochet on the level and on forward and rear slopes.

This sketch (A) is assuming that the Field Artillery Drill of 1889 is

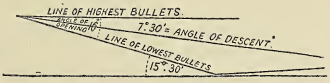


FIG. A.

wrong when it gives the angle of opening as 8° ; and that the 12-pr., hand-book of 1895, is right, when it says on page 33 that "the average angle of dispersion is 16°."

Again (*vide* page 63, Vol. II., Field Artillery Drill, 1889) "with *percussion* shrapnel the ascending angle after graze is greater than the angle of descent. Thus an angle of descent of 6° gives an angle of ascent after graze of 8° (B) if ground sloped 2° towards the target,"

FIG. B.

(*vide* sketch below, *see* Fig. C.)

FIG. C.

All this is omitted from the drill-books of 1893 and 1896.

Illustrating the sweeping effects of artillery fire against troops on the reverse slope.

"This would give a descending angle of 4° and an ascending angle of 5° 40′ to the slope."

"Or on ground sloping up to the target at 2° slope in the opposite direction." *See* Fig. D.

FIG. D.

"The angle of descent would be 8° and the angle of ricochet after graze would be 10° 40'."

Thus showing the comparative immunity from effects of ricochet of troops on forward slope.

Page 60, Vol. II., Field Artillery Drill, 1889, it says:—

"As the range increases, so does the cone of dispersion of the balls; because the velocity of the shell through the air decreases more rapidly than the velocity of rotation due to the rifling."

Page 81 Field Artillery Drill, 1896, says:—"That up to 2,000 yards the angle of cone is from 8° to 12° with base bursters and 12° to 18° with head bursters."

Troops on the reverse slope never safe from shell bursting just over the crest.

Page 63, Vol. II. of 1889, lays down that:—"The angle of descent of time shrapnel, especially at the longer ranges, suffices to sweep the reverse slope of most hills on which a gun can stand; even percussion shrapnel, which would then have a comparatively low angle of ascent after graze, would be very effective."

Is not this a great reason against putting our guns on the reverse slope when firing in the first artillery position or duel? (*Vide* Fig. 6 and 7, where the cover obtainable behind a crest for a man mounted and on foot is shown in colour.)

Also *vide* Figs. 2 and 3, where the angle of descent and the angle of opening of the "gun of the future" is given.

NECESSITY FOR SCREENS—EXPOSURE OF GUNNERS IN THE OPEN WHEN IN ACTION.

Necessity for artificial screens for guns in action on the crest and forward slope.

It is well nigh impossible to assimilate the conditions of manœuvre to those of war.

For instance, does any sane person for one instant imagine that a handful of gunners are always going to stand up in the open at each gun for hours within long-range rifle (1500 yards) range of infantry sharp-shooters laying flat on their stomachs and picking them off?

The answer generally given to the above is that it is never wise to teach men to "take cover." They will soon do that of their own accord when real bullets are being exchanged between the opposing forces. Best train them always to stand up to their guns. Quite so! but do you practice what you preach? Are not gunners showing the muzzles of their pieces just over the brow in the position of the Irishman expecting to hit something with his gun pointing round the corner? Your men are virtually behind cover of the worst kind. Again, do you never dig gun-pits or epaulments? And do you consider that it is a wise thing to bury a field-gun in a hole and fire it

3827

3000

4374

4000

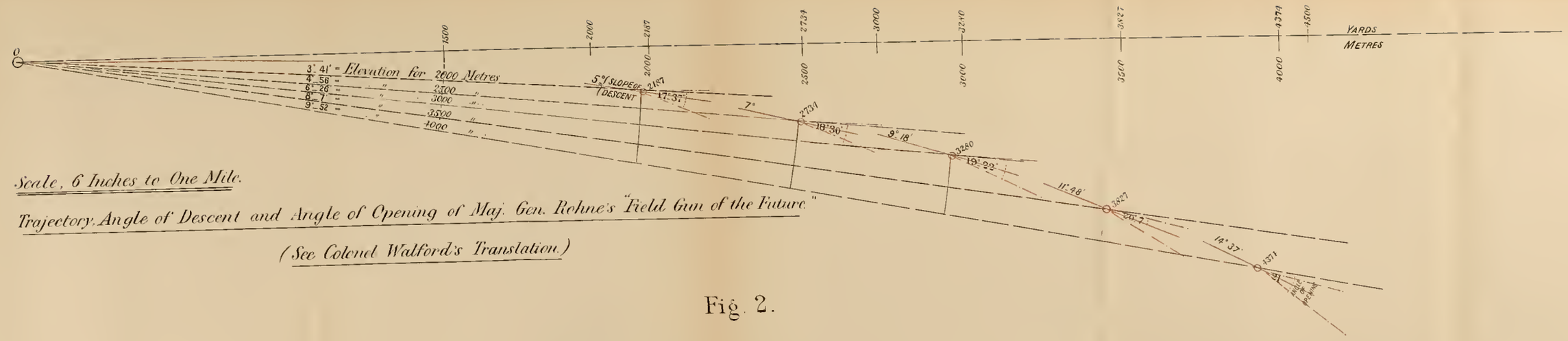
3827

20°7'

14°37'

4374

21°

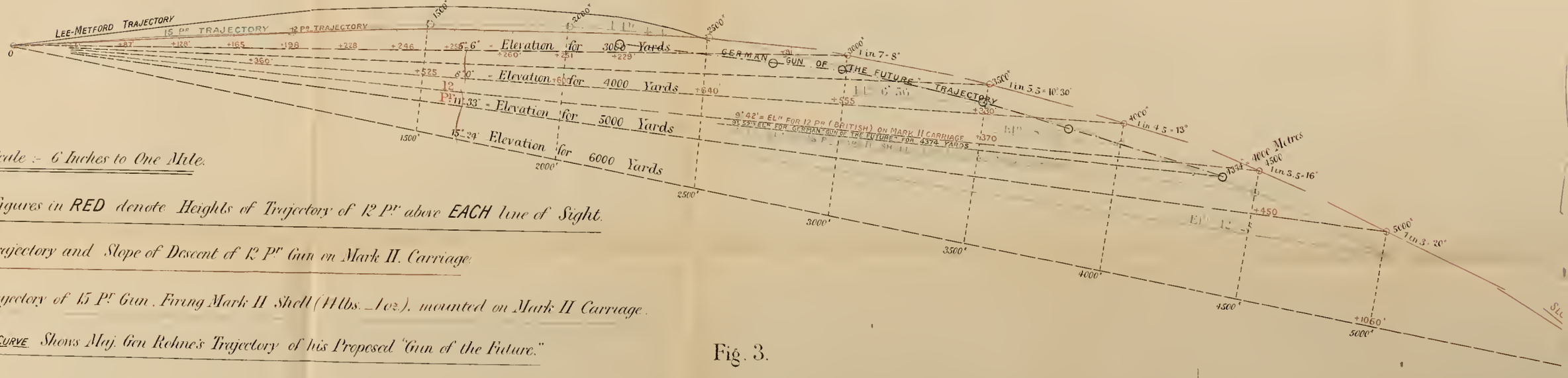


Scale, 6 Inches to One Mile.

Trajectory, Angle of Descent and Angle of Opening of Maj. Gen. Rohne's "Field Gun of the Future"

(See Colonel Walford's Translation.)

Fig. 2.



Scale :- 6 Inches to One Mile.

Figures in **RED** *denote Heights of Trajectory of 12 Pr above* **EACH** *line of Sight.*

RED *Trajectory and Slope of Descent of 12 Pr Gun on Mark II. Carriage.*

BLUE *Trajectory of 15 Pr Gun, Firing Mark II Shell (1 lbs. 1 oz.), mounted on Mark II Carriage.*

CHAIN DOTTED CURVE *Shows Maj. Gen Rohne's Trajectory of his Proposed "Gun of the Future."*

Fig. 3.

through an embrasure only enabling you to see in one direction? Again, think of the time it takes to construct a gun-pit, and also of the difficulty of concealing it when made and, finally, of the beautiful target it presents to the enemy when ranging! Are you quite sure that your detachments are quite safe from the searching effects of shrapnel bullets when ensconced in its recesses? You say that gunners are not to be trained to take cover; but is not the very opposite taught in the infantry? Why, every man of them, from the Brigadier to the advanced skirmisher, is told to take advantage of every indentation or unevenness of the ground to conceal his advance. Why should we gunners defy all the teachings of experience and blindly practice in peace what we would not be able to do on service, viz.: stand up in the open—exposed to view and unprotected from fire?

Infantry take cover.

Artillery stand to their guns in the open.

If you have followed me so far through this paper you will say to yourself: "What on earth is the fellow driving at? At the commencement of the paper, and in fact right down to the previous page, he has argued strongly against placing guns on the reverse slope. He wants to shove his batteries right forward under the enemy's muzzles so as to back up his own infantry and make his gunners take their share of the bullets. Now he suddenly turns round and says a handful of gunners are not going to stand up in the open exposed for hours to be fired at!"

Apparent contradictions.

Well, to this I reply: "*Concealment from view is better than protection from fire.*"

Concealment from view better than protection from fire.

There should be a happy mean. Bring your guns out of the second line or retired position behind the crest where they cannot see, to an advanced position where they will at least be able to take an intelligent interest in the battle as it progresses. Then, when you have got them there, conceal them if possible.

I contend that IT IS POSSIBLE to hide guns on the forward slope.

It *is* possible to conceal guns on the forward slope.

There are three ways of concealing guns.

The "Field Artillery Drill-book of 1893" says on pages 156 and 157 (*see* also bottom of page 12, "Field Artillery Drill, 1896") under "Choice of Positions":—

"The guns should be concealed from view—

(1.) By making use of natural cover.

(2.) By constructing artificial cover.

(3.) By taking care that the background of the battery is unfavourable to observation of fire by the enemy."

I ask the candid reader to say impartially, how often, in his own experience of field-days and manœuvres, have the artillery ever been concealed from view except by the first method, namely, "making use of natural cover?" The reverse slope position is THE ONE METHOD employed for the purpose.

Artificial cover is never constructed.

The only artificial cover ever sought for is obtained by digging gun-pits or epaulments, which of themselves are by many officers considered

Danger of gun-pits etc.

to be worse than useless. Why not construct artificial cover as recommended? It is not an impossibility. Personally, I designed a screen some years ago and experimented with it. I claim that it is both invisible to the enemy, also very portable and easy to set up.

However, apart from my feeble attempts, I am sure that some of us *can* invent a method of hiding troops in the open and on the forward slope.

Possibilities of concealment with smokeless powder.

Already the problem is well nigh solved. The position on the field of battle of guns firing smokeless powder is not proclaimed to friend and foe by the first shot, as heretofore, when the charge consisted of black powder. At 3000 yards guns are not so very visible, even with a bad background. This is especially the case when firing over heather, as at the recent New Forest manœuvres in 1895. I constantly noticed that it was hard to fix the position of Major Keir's cordite battery. One heard the report—that was all.

If shell were bursting in one's battery and one could not see where the opposing guns were, the only chance of finding the enemy would be to align oneself on the trough or furrow of a shell which had burst on graze. This cannot be called a very satisfactory method!

Major Keir's cordite battery at the New Forest manœuvres in 1895.

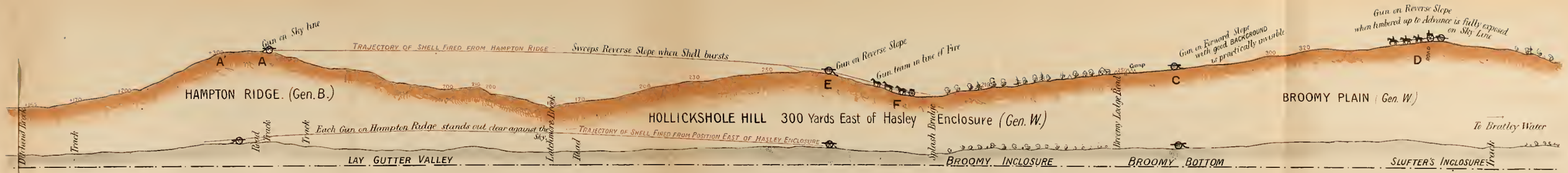
Major Keir, R.A., in his article in the last April number of the R.A.I. "Proceedings," is quite of the opposite opinion. In his "Plea for Indirect Fire" he is all for staying behind the hill and fighting the battle with his clinometer. I think I can prove, with the help of the English 12-pr. and 15-pr. and also with the German "gun of the future" trajectories, that he is in greater danger behind his mountain than when exposed to the enemy's plunging fire on the forward slope. All one has to do is to take a tracing of, or cut out, any of the three trajectories and put it to a section of the ground drawn on a scale of six inches to one mile (*see* Fig. 4).

I cannot give the angle of opening of our 12-pr. shell, as the drill-book only gives it as *half* that given in the last hand-book and half that of "the gun of the future" of General Rohne. But I think he, Major Keir, makes use of the best argument obtainable in favour of "smokeless powder and guns on the forward slope" when he says at the end of his article, "At the conclusion of the New Forest manœuvres an umpire was heard to observe that the smokeless powder had proved a failure, because it was impossible to tell what the guns were doing." I, personally, can vouch for the truth of this statement, as I could never see Major Keir's guns except on one occasion when they fought alongside. His was the only battery firing cordite.

As to (3), "taking care that your background is unfavourable from the enemy's point of view," I cannot do better than quote a few extracts from a discussion on a lecture in Dublin on the 15th Nov., 1892, by Colonel (now Major-General) J. F. Maurice, C.B., on "The artillery in 1870–1," Lord Wolseley being in the chair.

Opinion of present writer as to intelligent use of screens and background.

During the discussion after the lecture, I spoke as follows: "I would like to say one or two words about smokeless powder. We have now got guns which are invisible when they are fired. I think you cannot see a field-gun at 2000 yards if fired with this smokeless powder—that



Scale:- 6 Inches to One Mile. *Heights to Distances as 5 to 1. (BURNT SIENNA SECTION)*
Heights and Distances equal. (DARK GREY SECTION)

Two Days Manoeuvres in 1895 in the NEW FOREST, Artillery Positions.

Fig. 4.

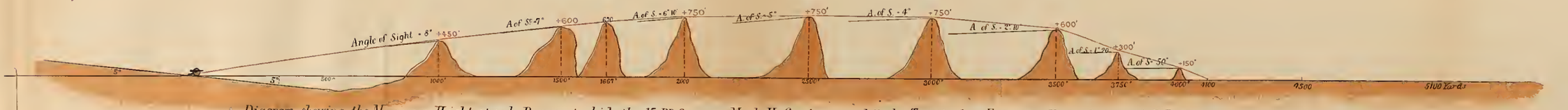


Diagram showing the Maximum Height at each Range at which the 15 Pr Gun, on Mark II. Carriage, can hit the Target when Firing on a Forward Slope of 5 Degrees.

N.B. When Gun is on a Level the Maximum Quadrant Elevation the Carriage will allow of is 14° 20'- 5100 Yards (OR SEE HANDBOOK 5440) *Scale:- 6 Inches to One Mile.*

Fig. V.

is, unless the gun is on the crest line. I do not think that artillery officers realise sufficiently the importance of not having their guns on the sky-line, where they form such good targets to men armed with the magazine rifle. A man, six feet high, walking on the top of a mountain, is very visible; the parts of him you see best are those which move most, that is to say, his legs; but if you could hide half his height, and, as it were, cut him in two by covering the man's legs with a screen three feet high in front of him, then you would have the effect of raising the sky-line, and he will not be nearly so conspicuous. An object, partly hidden, will attract less fire than one fully visible. This is a very important point considered in connection with our new smokeless powder. It is easier to obtain cover than you would imagine. Suppose that as Captain of a field battery, which has just come into action, you have to take the limbers to the rear to a position to be selected by you under cover if possible, but some 200 to 400 yards behind the guns. You probably can see the enemy, but you cannot discover the required cover from view, so you leave your horses and limbers as you think in the open and exposed. You then again ride forward to the front to attend to the supply of ammunition, &c. If you chance to look back, you may be astonished to find that your limbers are perfectly invisible. This is because a hedge or some other feature forms a good background. In the case where a battery was firing from the bottom of a hill at one higher up near the crest, Colonel Maurice told us that the former suffered very little loss from the enemy's plunging fire. I fancy that this immunity may be ascribed to the fact that there was a wood behind the guns in the valley, and that the background was favourable and deceived the gunners on the hill, both in their laying and observation of effect. I think that it may be laid down as a principle that *concealment from view amounts to immunity from fire*; and that in the attack this is to be applied by studying "background" a little more; but in the defence we can and should employ light screens, about three feet high, both for infantry and artillery, on occasions when there is no time to make shelter trenches or gun-pits. I think that attention will be paid to this in future campaigns."

Discussion on General Maurice's lecture in Dublin in 1892.

Lieut.-Colonel Molesworth, R.H.A.—"Colonel Hutchinson and other officers have spoken in reference to the position of guns. I think this is a point not thoroughly understood, and which requires more definite orders regarding their exact position on a slope. It is often impossible, in broken ground, as I have seen at Aldershot, to get as many as 18 guns into position without either cover or command being sacrificed. By command I do not mean the actual height of the ground, but facility of seeing the enemy. It is therefore often difficult to choose a position combining both advantages without running guns so far in advance of each other as to be beyond the limits of safety."

Colonel Maurice—"I cordially agree with the remarks which have been made as to the results that will be produced by the use of smokeless powder; and as to the increased danger attached to a position

taken up on a crest line. I think that it very often happens that you can get your screen by simply taking up position a little back from the crest, especially in some of our chalk country. If you have a tolerably good background, by simply withdrawing from the crest, you will very often get a screen from many of the positions from which you could be attacked."

Captain Guinness—"I have known a Major in command of a battery of artillery who ordered his men to cut down branches and put them in front as a screen."

Colonel Maurice—"Quite so, a very useful thing indeed. *Apropos* to what was said, I think, by Captain Guinness, I doubt whether it is possible to give definite orders beforehand as to the exact position on a slope on which you ought to place your guns. I do not propose now to give an opinion one way or another about the several positions to which I have alluded as to which is normally the best. I think it is a question on which the right course can only be taught by experience, actual training under various conditions, and on varied ground. If all the circumstances could be known, it might be possible to lay down beforehand which would be the most effective position; but it is different when the circumstances are not determined beforehand. Then each must act according to his own judgment on the ground. The circumstances will sometimes make one position best, sometimes another. For instance, in that case of the Prussians at Wörth, it seems to me clear that they came down the slope, not for the sake of coming down the slope in obedience to general instructions on that head, but because they wanted to get an opportunity to fire. As you say yourself, the vital thing is to get an opportunity to hit your enemy rather than to find protection for yourself by any other means. But then it seems to me that, in considering afterwards whether the position taken up was the best possible or not, you want to take into account all those circumstances of the effect of pitching and grazing fire, trajectory, sky-line and the like, of which I have spoken. For those I hardly see how we can get any adequate substitute for the recorded experience of war."

Lord Wolseley—"One of the officers who spoke in this discussion has laid very great stress upon the importance of keeping out of sight, as well as finding protection for your guns. It is a very important thing to keep guns out of sight, especially in these days of smokeless powder. The next best thing to actual protection of your guns is to keep them out of the enemy's view—if you can do so. In these days of smokeless powder you can open fire on the enemy at 2500 yards, whilst your guns, horses, wagons, limbers and men are screened from view. And although the enemy may find out where you are, he will have but a small target to fire at. If you are in the neighbourhood of trees, or only a hedge, and by using this means are enabled to screen your position, you will obtain for yourself a great advantage and an immense superiority over your enemy."

Opinion as to use of Screens.

Major-General Sir Charles Warren, K.C.B., R.E., writes to me :— Sir Charles Warren on screens.

"I am glad that you propose screens. I introduced screens in the Bechuanaland expedition and the Boers said it was most unfair, as now they could not pick off our artillery."

Major (now Brigadier-General) Tyler, R.H.A., in his most interesting paper, entitled "*Shield or shelter*," which should be read by every officer interested in this question, as to the best position for guns, says :— Maj.-Genl. Tyler on shields.

"It is clear that losses to artillery in men and horses in action are mainly due to infantry fire and that, if even partial protection can be afforded to them, the number of casualties will be considerably less. It is also clear that when it is necessary guns must be exposed."

Again later on :—

"Posting your guns in what is called an advantageous position generally means coming into action on the brow of a hill or rising ground, where part of your gun is in shelter. To such an extent is this idea now predominant, that at field-days it is—if not the one thing needful—at all events, the *sine quâ non* of a good artillery position."

Also :—

"In the case of uneven spaces and irregular slopes to the front, it frequently happens that guns cannot command the whole of the ground, while the brow of the hill partially intervenes. It would then be necessary to bring the guns on to the brow of the hill, or more probably, on to the exposed slope. Here then is one of the occasions when, if some protection be not given to the gunners, the service of the guns would soon become impossible. If, when so exposed, the gunners can be protected, how much greater will be their power of working the guns with accuracy and rapidity."

Then the use of steel shields on each carriage and limber is suggested. Total weight per battery, 270 lbs. Weight of shields.

Shields are all very well, but *concealment from view is better than protection from fire*. Even three invisible screens to cover a battery, weighing in all 56 lbs., are objected to on the ground of extra weight. Weight of screens.

Major Tyler concludes his article by saying :—

"Give the gunners all the shelter you can."

What the Cavalry Officer says about Artillery Positions.

The cavalry officer's criticism.

"You asked me my opinion about your own arm and its employment—I feel very diffident and hope you will excuse me if I put it plainly—so here goes :—

(1.) You gunners, you always put your guns right back behind the hill; consequently, we can get in at you three times out of five whilst you are busy firing at the opposing

artillery and before you have time to run up. Of what use is it to fire perhaps one round whilst we are crossing the only exposed part of the ridge, seldom exceeding 100 yards in width, at a rate of 12 miles an hour or 100 yards in 17 seconds? We always charge in successive lines or waves. It stands to reason that you can only hit our first line whilst the others are enveloping you on the flanks.

(2.) We, in the cavalry, are in the habit of laughing at your game of hide-and-seek behind the crest at the commencement of a field-day. One side shows its muzzles over the top, then the other follows suit. If you draw a straight line from one gun on one side to another gun on the opposite ridge, this will practically give you the whole of the ground visible to the batteries on each side during the artillery duel. Above this line the guns only see the opposing ones. We, of the cavalry and infantry in the valley between, have it all our own way whilst you are peppering each other. You, no doubt, put out what you call a 'ground scout,' or a 'combat patrol,' or a 'cavalry escort;' but it is doubtful whether the horses or their riders would care to stand for a couple of hours or so in front of guns firing live shell. On our side we can generally draw off their attention by a little manœuvring and we often deliver a charge home at your guns before you know anything about our presence. If you should by chance receive information in time, you have to run up your guns by hand on to and over the crest; and I need not tell you that this is no easy matter when the hill is against you and you have some distance to move them.

(3.) I said before that a battery of artillery is drawn by an irresistible impulse to fire at any guns visible on the move or in action. In the same way a cavalry commander likes nothing better than to have a 'slap at the guns.' If we cannot get you in front, we try to attack the flanks or we 'go for' your wagons in rear. It is not easy for a cavalry escort to look after the guns in action and the limbers and wagons as well, when the latter are nearly a quarter of a mile behind the position. On the other hand, if, on the forward slope, you are no longer in the dark, you see every phase of the battle. You can at any moment 'switch off' your fire from one threatened part of the fight to another. Cavalry cannot charge you; if they do, 'you have them on toast' from start to finish, and why? simply because you can see where you are and what is going on round you.'

WHAT THE INFANTRY OFFICER THINKS ABOUT OUR ARTILLERY POSITIONS. Infantry officer's criticism.

Question.—"Where do the gunners generally place their guns in action?"

Answer.—"On the crest and on the sky-line."

Question.—"Is that, in your opinion, the most suitable place for them?"

Answer.—"No; they should be at least 10 feet vertically below the crest on the forward slope. A hedge or even a green field as background will make it ever so much harder for our men to hit them. On the sky-line a gun and its detachment present a target 7′ × 5′ 6″ for us to aim at; it is very much easier to direct infantry fire on to a rectangular target, right up against the sky, than when the same objective is placed nearer to us and lower down the hill.

Besides, in my opinion, the bullets passing over the guns on the forward slope will be caught or 'fielded' by the slope in their rear and will not hit the horses and reserves behind the crest. To strike the latter, a considerably larger amount of elevation would have to be put on to the rifle sights.

This immunity from fire does not apply when your guns and horses are all of them on the crest or reverse slope, because all are then in the same trajectory and a bullet which misses the men serving the gun will hit the horses in rear, because they are placed exactly in the path of the bullet." (*See F* in Fig. 4.)

NOTES ON ARTILLERY POSITIONS.

EXAMPLE I.—Artillery tactical day under Sir Evelyn Wood in 1893—"The battle of Weaver's Down":— Tactical examples. I.—Weaver's Down.

Southern Force.—Colonel Marshall, commanding a Brigade Division, R.H.A., three batteries, 18 guns, with ammunition column in rear, was posted on the crest of Weaver's Down facing north.

Northern Force. — Colonel Maurice, commanding a Brigade Division, Field Artillery, with an ammunition column in rear, was posted near "Woolmer Pond." These batteries were separated and were well placed in the heather. One battery on the left was screened by and could just fire over the tops of the trees in a plantation. The centre battery was completely covered up to the gun axle-trees by heather and was perfectly invisible to any of the Southern Force, owing to its having a good background in the shape of a wood. Colonel Maurice's batteries, which were occupying a series of rear-guard positions, were firing up-hill; whilst Colonel Marshall's individual Horse Artillery guns stood out up against the sky at a distance of 2500 yards.

As soon as Colonel Marshall's force were ordered to advance down the northern slopes of "Weaver's Down," his guns and teams became perfectly invisible in the haze; but Major Hay's troop of Horse Artillery was put out of action by Sir Evelyn Wood for moving in column formations. No umpire with the Southern Force could possibly tell that Colonel Marshall's advance was invisible at the time.

This is where the difference between peace manœuvres and war conditions comes in.

Moral.—

Lessons.

(1.) Do not have your guns on the sky-line.

(2.) Put them on the forward slope, if not too steep, with gun teams behind the crest.

(3.) Conceal your guns in heather or in front of a wood.

(4.) Do not be afraid of the enemy's plunging fire when they cannot see you.

II.—Spicheren.

EXAMPLE II.—"Battle of Spicheren":—

Colonel (now Major-General) Maurice, C.B., says: "French on very precipitous spur—the Rötherberg—higher than the 'Fölster Heights' occupied by the Germans. The only place for French guns to get any effective fire was the crest, right on the sky-line. Here there was only room for one battery which had, however, a wide command of the plain.

The lower heights on the other side gave ample opportunity for a very much more concentrated fire upon the French battery than could be returned."

Cæsar's Camp.

From the description, one might imagine the French in a defensive position on the edge of a crest of Cæsar's Camp or Hungry Hill at Aldershot, firing north and west at Prussian batteries at Eelmoor Plain and Miles' Hill. Only a few batteries could line the height, but a very large number of guns could fire in a circle and concentrate on the French placed up against the sky-line.—(*See* also tactical examples given on pp. 69, 70 and 71 of this paper).

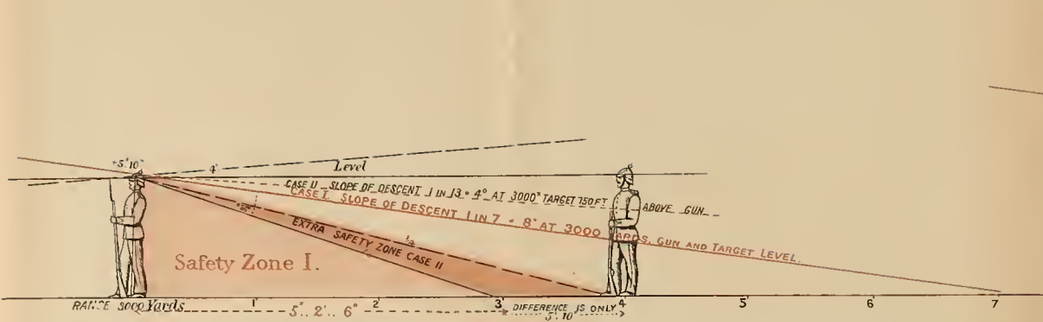
Anyone acquainted with Aldershot knows that the guns on Cæsar's Camp *must* be on the very edge of the precipice. Here they can deliver a plunging fire all round in a semicircle; but, according to General Maurice, "Plunging fire makes every error of range tell severely against the efficiency of fire." On the other hand, "a grazing fire is effective with a wider error of range."

Whilst firing down on the Long Valley, these guns on the heights must stand up against the sky-line and present a clearly defined series of targets to the guns below. As this is a defensive position and there is plenty of time, I would put up *thick* screens in rear to deceive the layers as to the true position of the edge of the hill. These screens must act as a dark background or hedge. A gun has a front of roughly two yards. Guns are now to be placed 20 yards apart. Two into 20 goes 10 times.

If I raise a screen four to five feet high, immediately in rear of the guns on the crest, I shall—

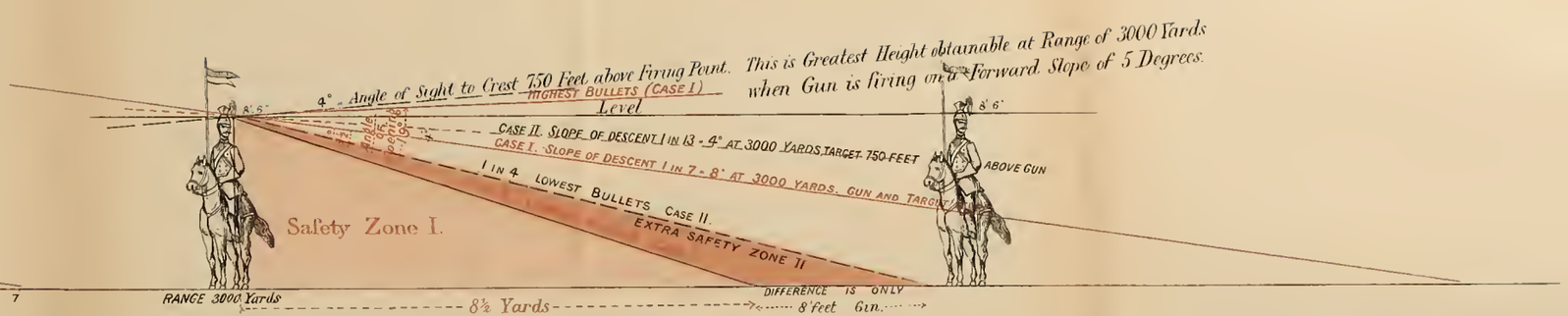
1st.—Do away with the guns projecting on the sky-line and thus make it 10 times more difficult for the gun-layers and infantry and sharp-shooters below to pick them off.

2nd.—Artificially raise the whole crest line four to five feet and render the guns invisible.



Sections showing Greatest Amount of Cover obtainable behind a Crest by Men on Foot and when Mounted. FIRST: When the Target is on same Level as the Gun.

Fig. 6.


4° Angle of Sight to Crest 750 Feet above Firing Point.
This is Greatest Height obtainable at Range of 3000 Yards when Gun is firing on a Forward Slope of 5 Degrees.
HIGHEST BULLETS (CASE I)
Level
8'6"
CASE II. SLOPE OF DESCENT 1 IN 13 = 4° AT 3000 YARDS, TARGET 750 FEET
CASE I. SLOPE OF DESCENT 1 IN 7 = 8° AT 3000 YARDS, GUN AND TARGET
ABOVE GUN
1 IN 4
LOWEST BULLETS CASE II.
EXTRA SAFETY ZONE II
Safety Zone I.
RANGE 3000 Yards
8½ Yards
DIFFERENCE IS ONLY
8 Feet 6 in.

SECONDLY: When the Gun is on a Forward Slope of 5 Degrees, and the Greatest Elevation Possible is given to it & the Height of Target above Gun is 750 feet.

Fig. 7.

Major-General Maurice says, with reference to this battle of Spicheren :—

"It is much more easy to see guns standing out on the sky-line than it is to see guns with a dark background." "Firing up against the sky-line is therefore much more effective than firing down from it." (*See* p. 12, General Maurice on "Artillery in 1870–71").

EXAMPLE III.—"Gordon at Khartoum" :—

III.—Khartoum.

General Gordon at Khartoum, when the Mahdi's men were firing at his earthworks every day and constantly picking off his men, conceived the idea of making huge canvas screens projecting 10 feet high over his parapets.

The Khalifa's men promptly raised their muzzles and the bullets flew harmlessly over the heads of Gordon's men.

EXAMPLE IV.—General Maurice's Lecture in Dublin on "Artillery," pp. 18 and 19—"Battle of Wörth" :—

IV.—Wörth.

"There is another curious point in the character of the position taken up by the great array of guns at Wörth which has reference to the question of command on which I have already touched. The point like the other I noticed was, as I think, rather exaggerated by some officers who soon after the war enlarged on it. Still it is worth stating and is an interesting point as far as it goes. The hill on which the Germans had to take up their position fronted towards Wörth on the opposite side of the valley to that from which the heights of the French position rose.

The Germans *came over the top of it.* They did not fire from anything like the crest of the high ground, *but came down the slope and come into action behind an underfeature.* Now it has been said in relation to that, that it was a deliberate choice of ground on the part of the Prussians, who calculated that the French shells, when directed against that slope, would strike perpendicularly into the bank and so not produce nearly the same effect as they would have done if they had been directed over the crest of the hill, so that the lie of the ground would more nearly correspond to the trajectory of the shot. I think it is quite possible that, to a certain extent, the character of their position may have tended to save the Prussians from the apparently tremendous exposure which they made of themselves in that long array opposite to the French. But I am firmly convinced that that was not the motive that made the Prussians go there—the motive that took them there was that it *was the best place from which they could see the French and hit the French.* They trusted entirely to the enormous concentration of their artillery and instead of choosing a place where they would be least exposed to the French shells they preferred to be in a place where, by bringing an overwhelming fire to bear upon the French guns, they could most effectively knock them out of time and, by so doing, protect themselves from the French fire. It was a question of the great efficiency of their concentration, of the effect produced by their concentrated fire and not of the actual local advantage of the ground."

So it is evident that it is no new thing I am suggesting when I say that we should *boldly advance our artillery over the crest and down the slope towards the enemy.* Here at the battle of Wörth we have it clearly demonstrated that by so doing we get :—

Lessons.

(*a.*) Room for a larger number of batteries and, therefore, greater concentration of fire.

(*b.*) Power to see the enemy more distinctly; and this is everything when smokeless powder and, consequently, concealment of guns is the rule.

(*c.*) Greater keenness to meet the enemy and more co-operation of the two arms—infantry support advance of guns—guns that of infantry—they interchange positions, and afford mutual support to drive back a counter-attack.

(*d.*) More exposure to plunging fire and, therefore, less ricochet, because shell strikes ground more nearly at right angles.

Example V.—Example of use of screens :—

V.—Riel's rebellion in Canada.

An artillery officer in the Canadian forces told me that on one occasion his battery was brought into action on the very edge of a plateau against Riel's men. Below was a nullah or rather valley, 300 yards wide, full of brushwood, which reached up and covered the opposite bank.

He was ordered to shell the rebels out of this wood. He *had* to go there; but their rifle fire knocked over his men every time they stood up to serve their guns.

Finally, he had to collect some brushwood and other material for a screen in front of his guns to conceal his men's movements. *Then* only was he able to fight his battery.

Example VI.—Infantry sharp-shooters *versus* gun detachments in the open on the sky-line :—

VI.—Imaginary infantry attack on guns at Okehampton

The following contention I do not give on my own authority, but there is something in it. It is very hard on the R.A.

Instead of one battery firing from "Holstock" on No. 1 range at Okehampton, given a line of 60 guns in action on a similar crest firing over heather at the enemy's guns, 3,500 yards off, on the northern slope of "Yes Tor." These 60 guns would take up a front of at least 1200 yards. Opposed to them is a force of infantry advancing up the West Okement river, whose numbers are neglected for the purposes of this argument, all except the firing line, occupied by one man to every yard. This gives 1,200 men in the firing line advancing over the ridge between "Blackdown" and "West Mill Tor" towards "Holstock." This ridge is also assumed to be 1,200 yards long. Now supposing that the infantry commander, instead of advancing his 1,200 men in a line, calls for volunteers, or elects to pick out his 120 best men, all crack shots, and starts them off down the hill towards the guns 1600 yards off at irregular intervals and distances. The ground is rough; there are rocks and tussocks in every direction.

There is nothing to prevent these men advancing almost unseen to

the brook and up the opposite slope to within 1000 yards. They can fire continuously, taking their own time about it; and it is claimed that in an hour's time they would have played considerable havoc amongst the detachments standing to their guns up against the sky on "Holstock." The artillery at Holstock, on the one hand, maintain that no hostile infantry could be got to face the frontal fire of their 60 guns; and even if they did so, their own infantry could be sent forward to drive out these sharp-shooters. How to attack the artillery.

The attacking infantry, on the other hand, argue that the Holstock artillery commander would not allow any infantry to mask the fire of his batteries and to incur the risk of a premature shell bursting amongst them, whilst engaged in beating off the sharp-shooters.

They also say that their volunteers would be practically safe from the fire of the 60 guns, for the simple reason that the latter would have no line or any other visible object on which to lay. A scattered advance of 120 men over a front 1200 yards wide, is quite different to an advance of a firing line of 1,200 men at one pace interval. Guns can range on the latter, but not on the former.

EXAMPLE VII.—A natural screen in front of guns:—

In 1895, at Aldershot, on the occasion of a tactical field-day, under Colonel Wallace, R.H.A., Major Davidson was commanding 3 batteries R.H.A. acting in pursuit. VII.—A Horse Artillery pursuit at Aldershot in 1895.

The enemy's infantry had just been driven northwards over a ridge about Gravel Hill and through a plantation on the far side. They were retreating over an underfeature bare of everything but heather and were rallying on a couple of batteries distant 600 yards from the wooded crest.

Major Davidson's instructions were to press the enemy at every point. He brought his batteries into action amongst the trees in a position from which he could just see the guns and infantry. They were also visible to the commanders of batteries, *but his own guns were masked.*

His idea was that he must screen his guns from the enemy's view. He said that when the guns were fired, the shell would soon clear a way through the tops of the pine trees or pass over them.

If they were to burst prematurely, it would not matter. The shrapnel bullets would carry up to the enemy. His guns would be invisible and safe from rifle fire. His detachment horses and gun teams would be quite safe during "limber supply."

All the while his cavalry would be holding the northern edge of the wood and watching the enemy.

CONCLUSIONS.

Conclusions.

The conclusions I arrive at after investigating on the ground and in plan the various positions taken up by artillery in action are as follows:—

(1.) *It is impossible to prove conclusively that one position is preferable to another.* Even if dummy batteries were to be fired at in various positions on the land ranges in England, Ireland and India, it would greatly depend on the individual skill of the different battery (1.) War the true test of which is best position.

commanders and infantry leaders whether a larger or smaller number of hits were obtained against guns placed in front, on top or in rear of a ridge.

The results of Competitive practice prove this. A battery often shoots beautifully during the elementary and service practice at Okehampton, but goes to pieces under the strain of the Competitive. In the same way, a 1st prize battery at Competitive might not do so well as another when casualties are being caused by the enemy's fire.

(2.) Cases against use of reverse slope.

(2.) Having admitted (1), I may perhaps be allowed to say that *guns should seldom, if ever, be placed on the reverse slope of a hog's back* :—

(*a*) When the ridge in front is very wide.

(*b*) When the reverse slope, on which the guns stand, exceeds 5°.

(*c*) When the ground in front sinks very much towards the enemy.

(3.) Cases for use of reverse slope

(3). *Guns should be put on the reverse slope of a hog's back* :—

(*a*) When it is *absolutely impossible* to hide them on the forward slope or crest by a natural or artificial screen of any sort, and when the range is very short.

(*b*) In certain cases when the slope *immediately* in rear of the summit of the hog's back does not exceed 5° or 1 in 11.

(*c*) During the artillery duel at long ranges, when the slope in rear of the crest suddenly increases from something under 5° to a slope exceeding 20°; thus affording protection to the limbers and wagons from the enemy's artillery fire falling at an angle of descent of 9° to 11°, to which we must remember to add half the angle of opening of shell after burst, viz. :—($\frac{18}{2}$ to $\frac{20}{2}$ =) [1]9° to 10°, thus arriving at an angle of descent of lowest shrapnel bullet (at ranges of 3,500 to 2,500 yards) of 18° to 21°. If the slope suddenly increases to 20° the limbers are safe.

(*d*) When there is absolutely no position on the front slope, owing to the steepness of the incline; and when the crest is (what we call when hunting in Ireland a 'razor bank') too narrow for a gun to stand on.

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[1] *See* page 39 and trajectory (Fig. 2) of Maj.-Genl. Rohne's "Shrapnel fire of Field Artillery," from translation by Colonel N. L. Walford, R.A.

N.B.—The angle of opening of English 12-pr. shell is less than that of the French or German shell, according to the Field Artillery drill. Thus we must be prepared for much more searching effects of shrapnel fire behind a crest than we are accustomed to reckon with in England.

However, the 12-pr. hand-book says the angle of opening averages 18°. Probably the latter is right. *See* Fig. 2 and 3.

(*e*) Guns in the attack may fire over a hill and use clinometers when the enemy is known to have a great superiority in the number of batteries, and when it is impossible to approach unseen over the crest and down the other side.

In this case our guns should be placed a considerable distance, 300 or 400 yards in rear of and below the crest, so that the bullets set loose by the action of the enemy's fuzes set to burst just over the crest, may have sufficient space and time to expend and reduce their velocity before reaching our guns.

(4.) *Occasions when the position on the crest should not be taken up.* (4.) Cases against "crest" position.

(*a*) When there is a 'straight edge' or 'sky-line' over which the guns and detachments project and show up distinctly.

(*b*) When the ground available on the ridge or crest is so limited that there is not sufficient room for all the batteries.

(*c*) When the position has too great a command and the fire would be too plunging, thus losing all the effects of ricochet bullets.

(5.) *Cases when the crest should be occupied*:— (5.) Cases for use of "crest" position.

(*a*) When a very large number of batteries are to be brought into action low down on the forward slope and it is thought necessary to have a second tier of guns above on top of the hill in rear, to draw off the enemy's fire from the advanced batteries and to cover their advance.

(*b*) When there is a higher crest in rear which prevents the guns in action appearing on the sky-line from the enemy's point of view.

(*c*) When the opposing guns occupy a more elevated position than our own, which will not then show up against the sky-line.

(*d*) When it is impossible to see from any other place.

(*e*) When there is a natural or artificial screen forming, either a thick background in rear or an almost invisible obstacle to the enemy's view in front of the guns.

(6.) *Guns should be placed on the forward slope* at all stages of the attack:— (6.) Cases for use of "forward slope."

(*a*) When they can be hidden from the enemy's view.

(*b*) When they have their own infantry in front of them to engage the enemy's sharp-shooters.

(*c*) Whenever their presence can be of use to support their own infantry or cavalry and to form a rallying point if driven back.

(*d*) When the forward slope does not exceed 6° or 1 in 10; but care must be taken not to attempt to fire at an object over 4,000 yards if that object is any height above our own 12-pr. or 15-pr. guns on Mark II. carriage, (*see* Fig. 5 and pages 71 and 72) else holes will have to be dug for the trails under the enemy's fire before we can reply to it.

(*e*) In the defence, when a reasonable chance exists of getting the guns away in the event of a retreat being ordered, as when a railway cutting or an underfeature with a dip in rear is made use of to hide the limbers. In most cases, general officers will even dare to sacrifice their guns, if a position has to be held to the last. It will always be an operation involving heavy loss to limber up and retreat in face of infantry fire within 800 yards (*vide* Glenbeigh experiences, Captain Crampton, R.A. Institution "Proceedings," Vol. XXIII, No. 5. *See* page 196.)

(7.) Cases against use of "forward slope" position.

(7.) *Guns should not come into action on the forward slope :—*

(*a*) When within 1000 yards of infantry sharp-shooters, unless it is possible to send out skirmishers on our side to repel them.

If this is done it will be necessary (as is done in all foreign armies) to fire shell over the heads of our own infantry.

(*b*) When there are woods, hollows and other hidden ground in front of and within 1000 yards of the guns held by the enemy.

(*c*) When unsupported by infantry; when the background is unfavourable; when it is absolutely impossible to hide the guns by natural means and when there is no material at hand to create artificial cover.

(*d*) In the defence, when it is absolutely impossible to bring up the gun teams or limbers when pressed hard by hostile infantry at ranges under 800 yards. In a rear-guard action in retreat, it will seldom be possible to occupy the forward slope, because it would be difficult to withdraw one's guns in time.

(8.) Rule for level ground.

(8.) *When fighting on a level plain, care must be taken to put guns on the highest ground available*; a difference of even 18 inches

C. D. GUINNESS, R. A.

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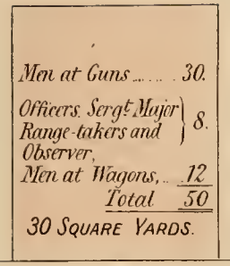
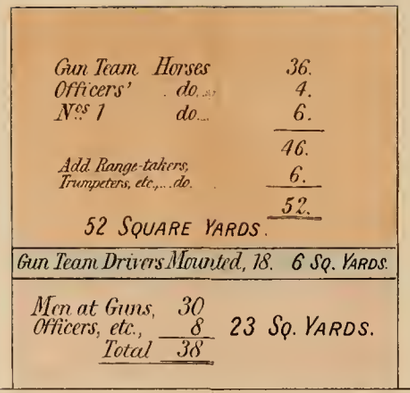


30 Sq. Yds.

Horse or Field Batt. "Wagon Supply."

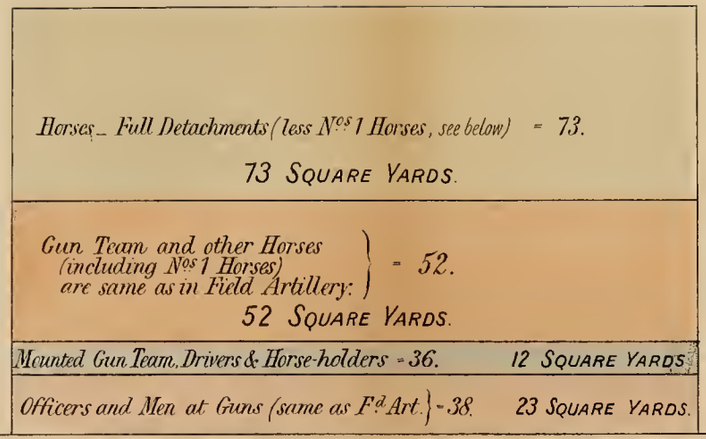
Fig. 8.



81 Square Yards.

Field Battery, "Limber Supply."

Fig. 9.


Horses — Full Detachments (less Nos 1 Horses, see below) = 73.
73 SQUARE YARDS.
Gun Team and other Horses (including Nos 1 Horses) are same as in Field Artillery: = 52.
52 SQUARE YARDS.
Mounted Gun Team, Drivers & Horse-holders = 36. 12 SQUARE YARDS.
Officers and Men at Guns (same as Fd Art.) = 38. 23 SQUARE YARDS.

160 Square Yards.

R. H. A. Battery, "Limber Supply."

Man Standing occupies .6 Square Yards.
do. Mounted ..... do. ..... .3 ..... do.
Horse, "end on" ..... do. ..... 1.0 ..... do.

Fig. 10.

Amount of Exposure is represented in each case.

Drawn by Capt C.D. Guinness, R.A.

Lithographed by McCorquodale & Co, Limited, London. N.W.

will be of great importance. It is absolutely necessary to see every bit of the ground within infantry fire. Practically, this is impossible if guns are posted in heather, high grass, etc.; but here we have the great pull of smokeless powder, which will not disclose our position; and again, we can further conceal our guns by brushwood, screens, etc.

It must be remembered that we cannot fire over our own infantry on a level plain if the ranges are short, on account of the flatness of the trajectory of the newest field-guns. With the 12-pr. firing at 1000 yards, 16 feet is the highest point of the trajectory; with the 12-pr. firing at 1,400 yards, 38 feet is the highest point of the trajectory. This is too close to be pleasant!

APOLOGY.

Apology.

Lack of war experience.

Finally, I must make a most humble apology for having dared to dispute all the rules of theory and practice laid down by my superiors in rank in our own as well as in foreign armies. I have never seen a shot fired in anger. I have not been under fire; neither have I seen strong men falling on my right and left, struck down in an instant, singly and in groups. Still, who *has* seen an artillery duel on equal terms within the last ten years? Who knows the effect of concentrated infantry fire on gun detachments? It is not a question of nerve? The gun has no nerves; but the layers have and what about the battery commander, who has to "run the show?" Again, will infantry face the shriek of exploding shell, each containing over a hundred bullets? Or will all their fire be directed against those terrible engines of destruction—the guns—to the neglect of the opposing infantry?

Shell *versus* bullets.

No, I cannot but think that each one of us in his inmost mind tries to solve this problem and hopes the best for his own arm of the service. This is my reason for putting pen to paper. We all know how rash it is to expose one's head to the hornet's nest of criticism.

Criticism invited.

I can only hope for my paper that like the fox, which is being broken up after a good run, it will be a case of "tear him and eat him," and that the whole matter may be thoroughly threshed out and digested, especially by the "young entry," for after all the subalterns are the backbone of the British Army!

FORMULA FOR FINDING SPEED OF OBJECTIVE.

BY

LIEUTENANT F. BROWN, I.O.M., R.A.

The following simple formula for finding speed of objective may be useful to Garrison Artillery officers.

Although simple, it possesses the merit of being accurate if the following condition is allowed, viz: the range—whilst the object is travelling over one degree—is constant.

Let

R = range in yards.

t = time in seconds object is moving over one degree, measured by D.R.F.

v = speed of objective.

Then

$$v \text{ (in knots)} = \cdot 031 \frac{R}{t} \quad \ldots \quad \ldots \quad 1.$$

$$v \text{ (in miles)} = \cdot 0357 \frac{R}{t} \quad \ldots \quad \ldots \quad 2.$$

I also forward small diagram, by which the same result can be obtained without calculation. The diagram hardly requires explanation.

Examples :—

(1.) Range 4,000 yards and object moves over one degree in 15 seconds. Find speed?

Run the 4,000 yards range up vertically until it cuts the 15 second diagonal line; then measure the length of this ordinate on the scale at the left hand side of diagram and this will give the speed of objective in knots per hour. In this particular case, the speed is about 8·25 knots per hour.

(2.) Range 4,250 yards and time taken to pass over one degree 10 seconds. Find speed?

Adopting exactly the same process as in the last example, the speed is found to be 13·2 knots per hour.

These results can be confirmed by calculation.

A diagram of this description might possibly be useful in a battery and if made of reasonable dimensions, almost absolute accuracy could be obtained.

On the small diagram I submit, my own errors in reading speeds have not exceeded $\frac{2}{10}$ knots per hour, over results obtained by calculation and the average error over ten examples—which were read off in less than four minutes—amounted to ·08 knots per hour.

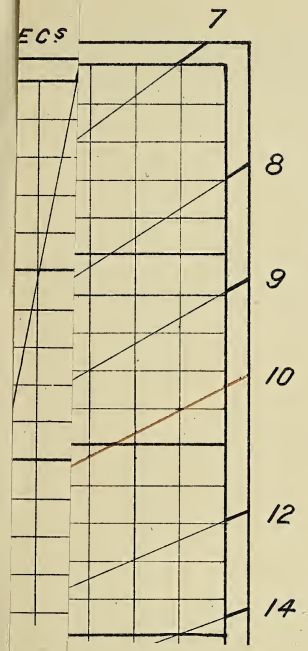

ECS
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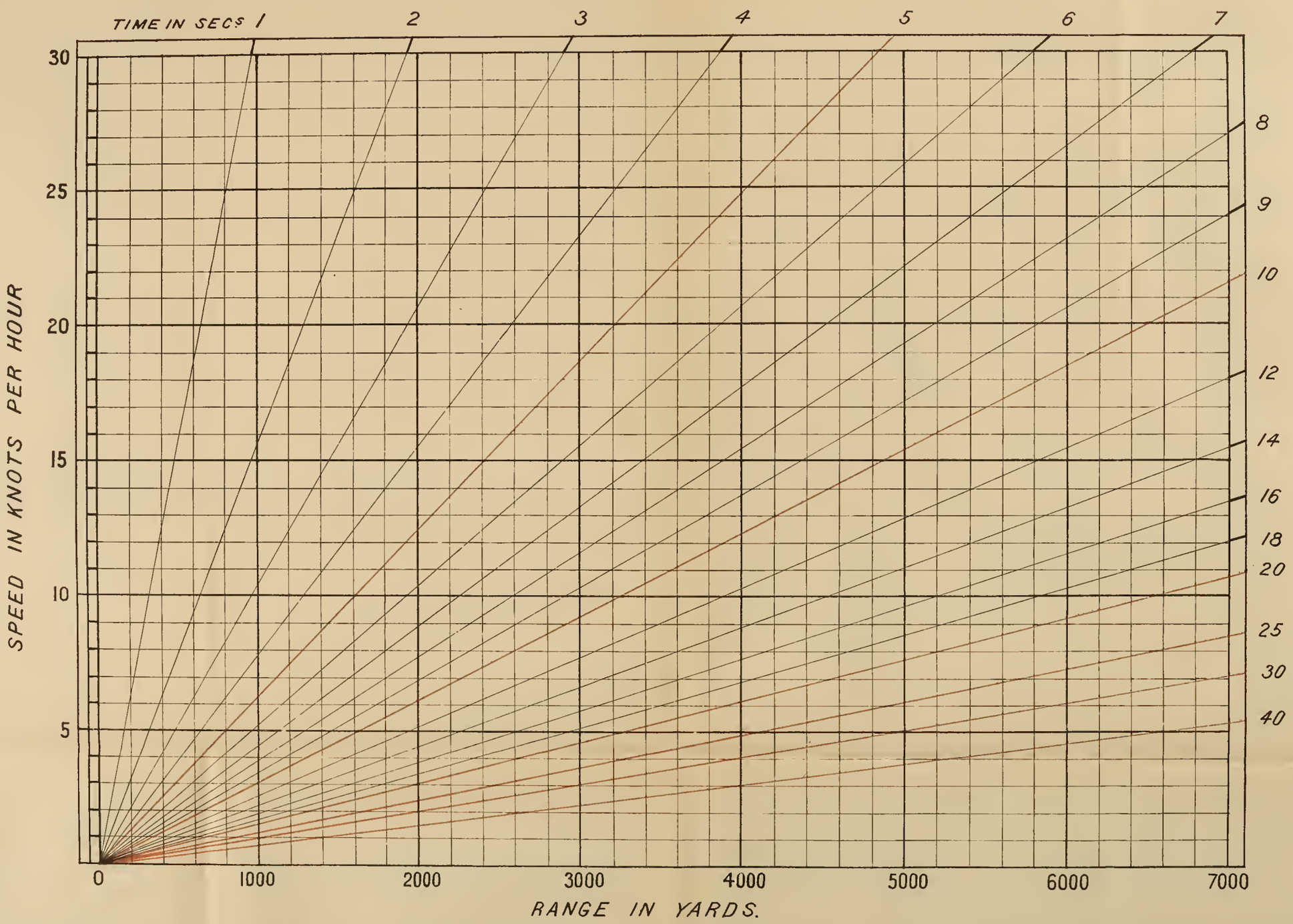
DIAGRAM FOR FINDING SPEED OF SHIP.

BY

Lieut F. Brown. R.A., I.O.M.



THORN WOOLWICH

A PLEA FOR

SPEED IN FIRING WITH GARRISON GUNS,

BY

MAJOR-GENERAL J. B. RICHARDSON.

THE fact that, unless guns used in Coast Defence are extremely rapidly served, they are now-a-days of little practical use does not appear to be as yet sufficiently recognized. Probably the miserable slowness of fire obtaining among Coast Artillery is largely due to very difficult peace conditions. Nobody likes the noise and concussion of their guns, and only those who have to make arrangements for the very small amount of practice available know the hundred and one objections and difficulties thrown in the way of Garrison Artillery getting a "free shoot" in a large majority of our forts; or the amount of worry and correspondence entailed before a gun can be got off at all. But want of speed in working is not wholly due to this, for the Garrison Artillery themselves, as a body, can hardly be said to have realized the absolute necessity of rapid work against modern ships. It must be admitted that they too frequently display a remarkable indifference to the lapse of time when, at last, an opportunity offers for pouring in fire and a want of true smartness in the division of responsibility and in combining the many small operations, either necessary or imposed upon them by too-complicated tools, which have to be performed before a shell can bury itself in an opposing ship. That of late years they have ceased to improve the material with which they work, and by improving it to cut out useless and time-absorbing operations, is much to be regretted, for it is generally by the small and simple inventions and improvements of actual workers that speed and efficiency are increased. As the modern Artilleryman may not invent he takes the battery gun, mounting, ammunition and surroundings, as he finds them. He knows that the constructive and manufacturing departments will, each in their own way, do their best; but he finds that their thoughts are not his thoughts and that they do not know his wants as thoroughly as he knows them himself. Still a Garrison Artillery Officer can occasionally do something for speed of fire. It may be no part of his actual duty to call attention to what may appear to him manifest defects in works which are being constructed for his use, under his very eyes, in his district;

yet the state would always be the gainer, if he can point out errors in time for remedy, and get himself listened to, a business which requires some energy. His criticisms, to be of value, should be founded on sound principles, and I hope to bring home to Garrison Artillery Officers that the main question, which should never be absent from their minds, should be somewhat as follows :—" With what rapidity shall I be able to pour a stream of shell into a rapidly-moving ship from this battery with the proposed gun, mounting, sights, ammunition, stores, and means provided for Range finding ? " Their information on these points is generally very scanty, and they may have but a poor idea of what the unfinished work is intended to look like on its completion, but they may gather much information by careful inquiry and a watchful eye.

Really great speed in hitting can of course only be obtained by a large amount of actual practice and brilliant training. Looking to the cost involved in firing large guns Garrison Artillery can, even in the most favourable localities, never expect to get the first. They can do their best as regards the latter but their training will not approach excellence unless they lay stress on speed in working.

The system of training adopted by the Royal Artillery in the early days of the Regiment ran more in the line of ensuring discipline and avoiding accidents by exact, minute and rigid drill, than in aiming at the attainment of rapidity, for which their mountings and accessories were never as suitable as those of the Navy, probably because the latter founded their requirements on a far greater amount of actual firing at practice. Until quite recent years Garrison Artillerymen, though, as now, they were men of grand physique, were below the average in intelligence ; and it was probably considered by the authors of drill books that a rigid system, even though entailing slow work, was the surest method of training such material.

During the same period the English Navy, though probably dealing with even less promising *personel*, by an almost exactly opposite system of training achieved a success such as the world has wondered at ever since. The sailor cared little about forms of drill ; speed in firing, even at the expense of accuracy, was all in all. He sought to add accuracy by getting to the closest possible quarters. And magnificently it paid ! And will pay again if the far better trained British sailor of to-day inherits the reckless pluck which led his predecessor to get near his enemy at all costs, and hammer into him the most rapid possible fire.

It is curious that two such different methods of gunnery should have been practised at the same time among servants of the same nation, using similar weapons ; and that both should have led to the top of the tree, for while Nelson and other Naval chiefs placed our Navy on an absolute and enduring summit, our Artillery, or at any rate our Garrison Artillery, who were perhaps greater sticklers for minute drill than either Field or Horse, were also the leading Artillery of the world, while its officers produced inventions which were universally adopted and remain in use to this day.

Until 1859 both services worked with inaccurate ordnance. Many guns were still in use which possessed no other means of giving elevation than quarter-sights and quoins, and laying was largely a matter of chance. It is probable that one of the reasons why Garrison Artillery did not adopt the Naval method of rapidly pouring in a mass of unaimed fire was because, unable to advance to decisive ranges, they hoped to obtain accuracy at greater distances by deliberate work.

Until the introduction of B.L. ordnance the area of water available to the Artillery of a coast fortress for the attack of ships did not much exceed 2,500 yards from the coast line. Fire effect was therefore sought by multiplying guns and siting them so as to bring a cross fire to bear in every direction. As there was delay and difficulty in firing S.B. muzzle-loaders at angles of depression, and their range was so short, nearly all were placed near the water's edge. Scarcely any mechanical aids were used, and there was nothing to interfere with a very considerable rapidity of fire being attained, for the projectiles were generally of a weight well within the lifting power of one man, a very important element in rapidity of service but one which has too often been allowed to drop out of sight. Consequent on the introduction of B.L. guns not only has the accuracy of fire greatly increased but the area of sea available for attack from fixed guns has been gradually and largely extended, and has now probably attained a practical limit of 7,000-yds. for fast work up to 10,000-yds. for considerably slower fire ; but, concurrently with this increase of available range, the number of guns has diminished, so that each gun is called on to do far more, while the time available for the attack of ships has decreased in a higher proportion. Garrison guns fired as fast, or faster, before the introduction of steam war vessels as they do now, but sailing ships moved exceedingly slowly and once in range were apt to be kept under the fire of stationary guns by failure of wind, the action of currents, or by wreckage of their masts, &c. Now-a-days ships can get out of the limit of practical range of Garrison guns, from any position in which they may be placed, in less than fifteen minutes ; unless therefore an exceedingly rapid fire is brought to bear the chance of injuring a ship during her stay in the zone of fire as she passes a fort, or forces her way through a channel, is exceedingly small. If guns, however, can ensure a large number of strikes, even with comparatively small projectiles, there is always a chance of disabling a ship sufficiently to keep her longer under fire.

At the present time, then, targets which will offer themselves to Coast Artillery move so fast that men trained on a slow and sure system have a poor chance of damaging them. In the Chino-Japanese war this was exemplified. The plan adopted by the Japanese was that indicated as probable in my paper " Defence of a Coast Fortress," Vol. XX., R.A.I. PROCEEDINGS, that is to say an attack in the nature of a reconnaisance was conducted to test preparedness, with a few ships engaging generally at a long range. The ships are said to have steamed leisurely along the whole front of Port Arthur, offering the Chinese Coast Artillery a rare opportunity but, though they possessed suitable guns, they were quite unequal to the occasion. No doubt had rapid, accurate work obtained among the Chinese gunners, the ships would have made off out of range as fast as they could, but then the reconnaisance would have failed, a subsequent Naval attack might not have been made, and during the few minutes occupied in getting away possibly one or other of the ships might have been disabled, and damage out of all proportion to what the ships could effect, would have been done ; for if a ship is so injured as to have to retire out of action it is not one gun but the whole of her armament which ceases to be a factor in attack, and it may be long before her guns can be of the slightest use again.

In 1859 the first really well-considered attempt was made in England to improve the service of Coast Artillery by starting a school of gunnery. A small number of Officers and N.C. Officers were assembled at Shoe-

buryness for a nine months' course of instruction. The writer was one of these officers and kept careful notes of this first course ; notes which abundantly prove the comparative ignorance of those days, and tend to show the vast increase in Artillery knowledge which has been effected in a period of less than 40 years. During the progress of this first Long Course of Instruction many changes were made for the better. Its great success as an institution and its future permanency were very largely due to the very happy selection of Colonel W. B. Gardner, R.A., as Chief Instructor. A man of superabundant energy and great determination, he possessed a practical gunner's mind far in advance of his time. He foresaw the coming necessity for rapid work and strove to attain it by reliance on individual intelligence and resource, as opposed to stiff unyielding drill. He suppressed the long-winded quotations from drill books with which instructors were wont to weary men, and compelled them to themselves demonstrate what was required to be done. He ensured officers knowing thoroughly what to expect from their men, and encouraged a tendency on their part to cut out useless work by making them go through every portion of the drill book, even to fetching their own stores and working through every operation with their own hands. Above all things he so inculcated speed of work in every department that it is very doubtful whether the records of his day, taking all things into consideration, have ever been beaten. Like many another earnest reformer he met with strong opposition and a *vis inertia* which eventually broke him down while, unfortunately for the Regiment, he was allowed to retire unrewarded and his great work unrecognised except by his pupils. For some time after, however, rapid smart work with guns became the fashion, gradually to relapse into slowness, latterly made more pronounced by abuse of the use of instruments, in themselves good servants but bad masters ; and by a discouragement of individual resource, inventive ability, and scientific attainments.

It is, then, very doubtful whether speed in firing by Garrison Artillery at the present time eclipses or even equals the records of earlier Long Courses. Men are better than ever they were, guns are more accurate, and could, as will presently be shewn, be fired at considerable speed ; the batteries, mountings, &c., are far more ingenious and costly. Why should there be room to doubt whether old records are broken ? Can it be that the improvements in surroundings are not altogether such as really increase the warlike powers of Garrison Artillery ? As regards long range work, there is no comparison, for the old guns had but short ranges ; but suppose the conditions of the contrast laid down equal numbers of men manning as many guns as possible ; and results were judged by the number of foot-tons of energy expended by each on a ship of their period, starting from a point near the battery. The old target ship moved slowly, the modern ship very fast. The system now in vogue compels the withdrawal of an ever increasing number of Artillerymen from the actual service of guns in battery, as P.F., D.R.F., Telephone men, and whatnot, so that an equal number of men man far fewer guns than of old. The guns are heavier, and give an enormously greater striking energy when their shot does strike, but their service, owing to their mountings, complicated emplacements, and numerous adjuncts giving accuracy at the expense of speed, is very slow, while it is most difficult to induce men trained to wait on instruments to act promptly on an emergency.

A gun which only fires, say once in four minutes, though it may possess great striking energy, needs every bit as much ranging as a gun firing one shot per minute before it can be made at all certain of bringing that energy into useful service. Starting with each gun loaded, and allowing four shots to be necessary for ranging (not by any means an excessive number with ordinary cartridges), before hits begin to be obtained with certainty, the powerful gun takes sixteen minutes before it can commence to use its energy by striking, while the lighter but quicker gun, will, by that time, have poured in twelve effective shots. Presumably the total foot-tons of energy expended on the target ship by the lighter gun would largely exceed that of the heavier gun, and there is a far greater chance of some vital part of the ship being reached, or of guns and men being put out of action, even if more or less accidentally, by the projectiles of the lighter gun.

From some time-narratives of actual practice from 9·2″ and 6″ B.L. guns at moving targets, worked by men well up in their drill, though with limited experience of practice, and striking an average of the speed in firing attained at this ordinary practice, which includes all delays in service, whether occasioned by slow mountings, indifferent means of obtaining ranges, poor communication, and casual stoppages from defective gear or wrong usage, but omitting delays due to peace conditions, such as foul range, the relative time-average per round bears about the following proportion :—

6″ B.L. High Site, Vavasseur	2
6″ B.L. Moderate Site, Barbette	3
9·2″ B.L. „ „	5

The figures represent a little more than minutes. There is no reason to suppose that on actual service the guns would be fired quicker, at any rate until they had been a considerable time in action, but no doubt had the practice been competitive it would have reached for a limited time a much higher average. I have, unfortunately, to compare the results with competitive practice.

The Admiral Commanding the Mediterranean Fleet has kindly given me averages of Prize firing of Ships armed with similar guns, as follows :—

6″ B.L.	6·8 Rounds in 6 minutes.
9·2″ B.L.	10 „ 12 „

Now, here is a speed for Garrison Artillery to work up to, and, as it is to be hoped that R.A. competitive practice will soon be carried out from 6″ B.L. guns, we may be able to obtain a fairer direct comparison with practice from Naval mountings and emplacements, and mountings designed for the use of Garrison Artillery.

But a short time ago a fleet was at anchor close under the guns of Gibraltar. It was known to be about to start, and 9·2″ and 6″ B.L. guns were manned. Their rates of firing were assumed to be the ordinary average of each individual gun, and, also based on practice experience, it was assumed that four rounds at least would be wasted in ranging, getting rid of the error of the day, powder and corrections, before the guns commenced to hit with certainty ; but that after that every shell hit. This, of course, is not quite true ; some shells would, in practice, hit in ranging, but on the other hand some would miss afterwards.

The fleet departed in regular order, and steamed round the South of the Rock at close range, certainly not at any time at more than fifteen knots speed, but the ships were all out of effective range in twenty-two minutes. Some guns, with a large arc of fire, were bearing on one or other of the ships all the time ; others, which commenced firing as soon as their arcs were entered, had only a limited portion of the twenty-two minutes to fire in, and had not sufficient time to get off their ranging rounds. It is unnecessary to go into details, but the result proved the absolute necessity for increased speed in firing Garrison guns, if they are to do any good at all ; the great gain in efficiency each gun that could fire quicker than another possessed ; the enormous advantage of choosing good sites with a large arc of fire ; and the benefit which would accrue by the use of ammunition which would admit of ranging being completed in two rounds. Again, during the Gibraltar manœuvres of 1896, torpedo boat night attacks were a great feature. It was abundantly evident that the chance Q.F. Guns would get, would seldom exceed three or four minutes, and would frequently be much less. Men trained to slow fire and distant control would do no good under such conditions.

No branch of the Artillery have to deal with such quick targets as Coast Artillery. Why then should they have the slowest firing arrangements ? The fastest target on which Field Artillery are likely to practice is cavalry in motion, say at 10 to 12 miles an hour, but a ship moving at 18 knots or a destroyer at 25, are targets racing at 20 and 28 English miles, and these will have to be operated upon. The pressing necessity for guns, ammunition service, mountings, sights, emplacements and range indicators, which will enable Garrison gunners to very materially reduce the time now occupied over each round is clearly exhibited when, by chance, a fast target is available.

A really suitable gun should always be ready for the layer. The time that a good layer necessarily spends in obtaining accuracy when a gun is well placed and found is very small, and whatever time is well spent in ensuring accuracy is not thrown away, but every second in excess of this necessary time that is occupied in loading, traversing, elevating, predicting and unnecessary ranging, is wasted and causes an enormous loss of power and effect.

Among the principal causes of slow fire are the following :—

(1) Unsuitably designed emplacements and mountings.

(2) Unsuitable sights, deflection leaves, and means of giving quadrant elevation.

(3) Dissimilar cartridges and slow supply of ammunition.

(4) Poor loading, traversing or elevating arrangements.

(5) Bad or defective communications in respect of command or range-indicating arrangements.

(6) Want of rapid targets at practice during peace.

(7) Unsuitably trained or unpractised men.

(8) Want of knowledge of the capabilities of ships.

(9) And as regards a large portion of the year, one due to nature, namely darkness and a want of means of lighting up the area of water covered by the guns, and consequent neglect of night work.

All the above are, in most cases, capable of improvement and even in the case of old armaments much might be done under 2, 3, 5, 6, 7, 8 and 9.

(1) Imbued with the old and slow methods of Artillery fire, the designs of land emplacements and mountings do not, for the most part, seem to have taken into consideration speed in firing at all, or at any rate, to nothing like the extent of the mountings provided for the Navy. Considerations of safety have been given infinitely more prominence than those of speed, and in some cases, pure gunner requirements have yielded to building conveniences. Now it may be taken almost as an axiom that security demands a sacrifice of speed much in proportion to the amount of protection given, though, as I have endeavoured to prove, extreme rapidity of fire is absolutely necessary now-a-days to ensure efficiency.

Thus, for instance, absolute safety could be ensured to a gun and its detachment by placing them in a deep cave at an entire sacrifice of hitting power ; or on the other hand, a gun could be mounted on a bed plate in the open, somewhat as seen on the Experimental Ground at Shoeburyness, neither gun or detachment having any protection, except, perhaps, a small gun shield. Here, the gunners are on a level with their work, and a maximum of speed, efficiency, and all-round fire is obtainable. There must be some satisfactory means between the two extremes.

Briefly described the usual course now pursued runs in the line of making a very expensive and highly-finished emplacement, grateful to the eye of the Engineer if not to the Artilleryman ; the emplacement usually taking the form of a more or less circular pit, of great depth and often of large diameter. A gun mounted in this pit would be safe from all but high angle fire, but would itself be incapable of firing except at great elevation. Therefore the necessary command over the edge of the pit is procured by partially filling it up with a drum, and causing a moderately large slide and carriage to traverse on its upper surface ; or, what has been perhaps more common, making an enormous slide and carriage to traverse on racers laid at the bottom of the pit. In either case a gun can by no possibility fire rapidly, nor is protection given to more than a portion of the detachment, for the men have to climb up and down to their work and raise the shell, &c., to an unnecessary height. In some of these mountings the detachments are as exposed as if the gun itself was in the open on a mounting calculated simply for speed of fire, while the climbing up and down is a serious addition to the labour of the men. The exposure of detachments in working is quite recognized for frequently, in addition to the pit, a shield is added. A slightly larger shield on a low mounting would probably give all necessary protection if there were no pit at all, and the gun could then be worked at high speed, without wearing out the detachment by unnecessary physical exercise.

Another form is the pit with the disappearing gun, which is apt to get out of order, is expensive, and needs much care and training. It is, necessarily, a slow firer, but it is very secure from casual fire. When a gun must be badly placed owing to no high ground being available reasonably near the water's edge, such protection may be desirable, but the guns must be recognized as slow firers, and should be multiplied for effect.

(2) Wherever high ground is available, with only a moderate loss of range, Garrison guns should be sited high. Guns on an elevation, even though slightly retired, can be made to be more certain and quicker hitters than is possible to those on a low site. They need little or no protection from ship fire ; and up to considerable ranges, proportional to their height, can dispense with the slow processes of P.F. and D.R.F. work by means of comparatively simple automatic sights. Such guns can be made to predict for themselves sufficiently well to indicate the cause and speed of a ship. By an "automatic" sight, is meant a sight, telescopic or otherwise, which, without calculation or assistance from the layer, sets itself in such a fashion, that after once having a part of the sight raised or lowered to correct for the error of the day, as found by ranging shots, for tide, and to bring the point of impact to the required height above the water-line of the ship, it is only necessary as far as elevation is concerned to lay on the water-line of the target vessel to strike it; and this without reference to the range in yards or elevation in degrees, or any calculation except for deflection, and the correction for this may be made approximately automatic also. There is no great difficulty in obtaining such a sight if the foresight is made the regulating movable sight, corrections being put on the hind. As regards deflection, if the gun is fitted to predict while the sights follow the ship, the course and speed of the vessel can always be obtained, while the deflection leaf if made to pivot can be worked without calculation by placing its bar roughly parallel to the course and placing the speed on it.

Low sited guns always present difficulties as far as our present knowledge extends, they may be made quick firers but can never be quick hitters except at very close ranges ; trust in flat trajectories is delusive and has led to many a badly-chosen gun-site. Low-sited guns are probably best worked by some of the existing slow methods ; range by P.F. or D.R.F., line over sights, and quadrant elevation ; but still there are several points in the best found guns on low sites which are capable of improvement with a view to greater speed in hitting. In all mountings, whether guns are well or badly sited, the layer should be enabled to see easily over his sights at the time of firing, and he should himself fire without having to take his eye off the sights. The means of knowing what quadrant elevation to give and of giving it quickly require alteration, while at present deflection is given almost by guess work or by calculation, causing long and unnecessary pauses for a sort of prediction by the G.G.O. or by the P.F. operator. The former should be kept fully informed of the course and speed of the vessel. There ought in fact to be no uncertainty or guess work in the matter so long as the vessel's course approaches an even line. Speed deflection leaves are much wanted. Though the sights used by the Navy are unsuited to more accurate Garrison Artillery requirements, yet what is good in them could be adapted to shore wants.

The discouragement of science and invention among Garrison Artillery Officers of late years has been a misfortune to the country. A "Shrapnel" or a "Boxer" would have no place now. It has tended to prevent simple adaptations of gear to fighting requirements. Manufacturers, unchecked by actual practical experience, produce most ingenious but complicated appliances that are often not really wanted, though their very cleverness frequently charms the Garrison Gunner into receiving them with open arms. He should refer all novelties sprung upon him to the practical tests of speed in working and accuracy,

and bear in mind that the cleverest inventions are the most simple.

(3) There are many more difficulties than meet the eye in ensuring that during the continuance of firing no change shall occur in the strength or weight of the powder contained in the cartridges used. Cordite may be left out of the question at present. Yet the fact that every precaution taken to ensure accuracy and speed in firing, such as well sited and suitable emplacements, good guns and mountings, perfect sights, expensive and accurate range-giving machines, and well-trained men, are rendered almost valueless if cartridges of varying ballistic properties are used, should point to the urgent need of greater attention being directed to this subject. Organization of ammunition supply is not perfect until every magazine from which a gun or group of guns is supplied contains but one ammunition group of cartridges ; and an ammunition group, to be of any value as such, must be formed of cartridges of closely similar ballistic properties. Cutting the Gordian Knot by merely grouping cartridges to suit dates of filling is of no practical value whatever. Such cartridges are found to occasionally vary the point of impact of successive rounds by hundreds of yards. It is of course most desirable to use up older cartridges at practice, and when these are broken up, carefully re-mixed and refilled for the purpose, they frequently shoot remarkably well. As to this there is no difficulty if sufficient lattitude is given locally and a drying and filling room exists, as it should in every fortress ; for odd lots can then be assembled, broken up, re-mixed and re-made for practice without reference to headquarters. The present system of merely using what is believed to be the oldest powder results, not only in bad shooting, but a continuous increase in the number of ammunition groups, and in each cartridge store containing cartridges of varying ballistic qualities, with an ever-augmenting difficulty in attaining speed in hitting. Though this might be looked on more as a question of pure accuracy of work, yet there is not a gunner who has had to direct fire that does not know the loss of time that ensues when his best calculations are hopelessly upset by a series of abnormal rounds. In some cases, in spite of careful sorting, ammunition groups are such that the guns they serve could probably not be ranged satisfactorily at all ; while if the powder were really sorted out into homogeneous ammunition groups, these would be so numerous that the guns would require ranging many times during an action, entailing a great waste of speed and efficiency of fire. To avoid this serious loss a number of small ammunition groups (over and above the amount required for practice), sufficient to completely fill the magazines of a group of guns, should from time to time be broken up, mixed, and re-made locally.

As a rule cartridges made entirely of the same original lot appear to shoot very much alike, irrespective of their dates of filling or of the magazines in which they have been kept ; and as far as can be judged, without a more systematic test than mere observation of practice, there is no drawback to placing such cartridges in one ammunition group.

As regards slow supply of ammunition :—With guns in high-sited batteries it is generally a mistake to keep the shell underground, and even in lower-sited positions it is only occasionally necessary. It is with the shell supply that, owing to their weight, delay generally occurs. A comparatively light cover is all they need if they are packed so as not to touch each other ; and much economy would be gained by storing

them on the level of the gun or, when convenient, slightly above it.

(4) All loading, traversing and elevating arrangements are simplified by low mountings, such as are met with in Naval use. Mountings which require a gun to be traversed round to a fixed loading place are slow and should be avoided whenever possible. To get really quick work the layer must be able to, at anyrate roughly, follow the ship during the process of loading and be ready to fire directly it is completed. Loading and laying should, in fact, be simultaneous acts. This principle is admitted by the introduction of Q.F. guns, and it is trying to the Garrison Gunner to see new emplacements constructed from which truly effective fire can never be obtained from a non-recognition of the importance of this aid to speed in firing but, leaving modern constructions alone, there is no reason that somewhat older types should not be rendered far more easily worked with rapidity than they now are and, by comparatively cheap alterations, be rendered doubly effective. The shorter the time the ammunition is in the gun after the first round of a series the more even is the shooting of the cartridge.

Traversing gear requires to be just sufficiently quick to enable the gun to easily follow the bow of a rapid vessel, moving across the gun at the closest likely range. Too rapid traversing gear is apt to make a heavy gun, on a heavy mounting, overrun and to convert it into a slow shooter. A traversing and elevating gear which can be, at anyrate partially, controlled by the layer is a desideratum. Above all things everything must work evenly, without jerks ; jerks are the bane of the layer and detract from speed.

(5) Bad or defective communications lead to uncertainty, disappointment, and slow work. The fewer communications there are, as a rule, the less the delay, while the most successful guns are those which require the fewest communications. A gun on high ground, with an automatic sight, finding its own range, needs exceedingly few accessories. The C.O. should be able to check its fire at his will ; to cause it to support other guns, or to aid it with warning and advice, but the fewer the messages sent the more rapidly is effective fire obtained. It follows that the communication should be the best obtainable, for indifferent methods of transmission tend to multiplication of messages, irritation and confusion. As a general rule after general permission to engage is given, no further message should be necessary until the progress of the action induces a weighty reason for switching fire. Slow fire at practice has often been largely due to the adoption of telephones which, as a sole method of communicating, have proved slow and uncertain for Garrison Artillery purposes. A recording telegraph capable of standing the shock of gun fire would save scores of messages and much delay. But telephones are installed so generally that they cannot be ignored ; what is required to supplement them is a loud continuously-vibrating electric bell close to each gun, which once set a going by the F.C., or B.C., shall continue to sound until switched off by the G.G.C., or G.C., who would at once stop firing and report. This would afford instant control and dissipate much anxiety, while the slower telephone would be looked to for explanation and instructions. Such a bell could be made capable of conveying more messages than one, with great rapidity.

Badly-sited guns and the more antiquated emplacements require, in most cases, more communications. Each must be taken on its merits,

it is impossible to satisfactorily lay down an absolute rule for all ; a very little of the most rapid possible firing best shows what is wanted, time being taken from the C.O.'s station issuing an order to engage ; with one or two attempts at stopping and switching fire. Such practice is often a revelation to those who believe in existing means of Fire Control.

(6) It is almost impossible for Garrison Artillery to become highly effective shooters at fast vessels without much practice, yet it is unlikely that a larger supply of practice ammunition will be granted. But the little they get could be, and would be, turned to much greater advantage if they had fast targets to shoot at. The drill book may teach them the right lines on which to work, just as the Badminton Library tells a novice how to hold a gun, and where to aim, to hit a rocketing pheasant, but the pheasant is probably safe from a man whose only experience of shooting is book lore. However few rounds are available Coast Artillery must have targets which can move at a pace approximating that of war vessels. If Artillery are supplied with reasonably fast steam vessels, under their own control, very fast targets would soon be forthcoming at the cost of a very few rounds, while the value of what was left would be vastly increased. It is next to impossible to make officers and men realize the necessity of extreme speed of fire when a target remains for hours in range, when they know that the tug supplied cannot, even without a target, slip away in a hurry out of the gun arc ; and when it cannot move reasonably quickly out of foul range into fair open water. Very fast targets would almost by themselves teach rapidity of fire and give the necessary amount of coolness and nerve. Every effort should be made to obtain them. Too often any sort of tug, obtained at a cheap rate because useless for any other work, is thought good enough for towing an Artillery target.

Even at the present day many a round is fired at a motionless barrel, in waters free from shipping, three or four minutes or more elapsing between each round. This is almost wasting the value of the ammunition. When Q F. guns are mounted the very fastest targets are needed to enable any useful training to be given and to eliminate false conceptions of fire control.

(7) The training of officers and men closely follows the means given them for work. Our officers and men are excellent but get comparatively little actual practice in shooting. Some of the slowness of their fire is due to over-control in details, a want of confidence in individual intelligence ; to anxiety to make the most of each of the few rounds given them ; and possibly to too constant criticism of practice. The life of a modern gun is but short ; its ammunition is expensive and it is useless to hope for a grant of sufficient heavy ammunition to ensure brilliant rapid shooting from large guns, but very good shooting may be possible nevertheless. To train layers to lay quickly, Group Officers and B.C.'s to act decisively and to avoid uselessly long predictions, it may be necessary to take extensively to 1″ tube shooting and to trust more than ever to drill rounds and existing annual allowance of ammunition for proficiency in loading, always working against time as soon as men pass from the elementary stage. Individual intelligence and self-reliance must be more cultivated and intelligent fire *superintendence* must supersede rigid fire *control*, at any rate among well-trained Garrison Artillery. Fire Commanders should so teach their subordinates

that they can trust them to open fire directly the occasion arises ; there is no time now, with fast targets, for bandying words on a telephone ; their rôle must be to assist, without obstructing, while retaining the power of instantly stopping fire if inefficient, or of rapidly switching it elsewhere if needed. The latter will always entail a loss of time and should be sparingly practised. It will probably be but seldom required in warfare, but now and then an occasion will arise where the possession of such a power might have an important bearing on an engagement.

It is a great mistake to suppose that rapid work leads to inaccurate, or that slow work ensures, good shooting. In most cases good shooting and rapid firing go hand in hand in competitive practice and training, for the two should go together. Perhaps the surest way of quietly bringing home instances of avoidable delays to those concerned is to have a time narrative kept at practice by an independent observer, with a watch before him ; such as the following :—

TIME NARRATIVE OF PRACTICE FROM HINIESTA BATTERY. } 6″ B.L. △ 6″ B.L. ☾

October 14th, 1896.

TIME.			NARRATIVE.	REMARKS.
o	′	″		
10	15	...	*Load.*	
	15	45	△ loaded.	
	16	5	☾ loaded.	Delayed in closing breech.
	18	...	*Sit easy.*	Might have been given earlier.
	20	...	*Attention.* Target about entering arc. Flag is up on launch.	36-ft. Target.
	22	...	Target reported in arc.	
	22	30	On dial 3200^{x} 25L slowly decreasing. Flag up on Battery.	
	22	50	△ *Case II. Lay.* Dial 3150^{x}	
	23	5	△ Commence firing.	
	23	38	△ Fired (Guess)—100. Line with rear of target. Detachment did not move to reload directly.	Slow.
	24	40	☾ *Lay.* 2950^{x} 25L.	Nearly a minute in making a correction.
	24	58	△ loaded.	Very slow ; wasted time.
	26	...	☾ *Commence firing.*	Why this delay ?
	26	10	☾ Fired (Guess)—30 slightly ahead. Detachment *load* immediately gun was fired. Target moving (guess) 5 knots.	Smartly fired. Smart.
	27	...	☾ loaded.	Good work, no delay.
	27	5	△ *Commence firing.* 2950^{x}	
	27	30	△ Fired — 30 (guess). Line rear of target.	Slow, probably long prediction.
	28	25	☾ *Commence firing.* 2950^{x} dial.	3 minus rounds ; B.C. slow again.
	28	35	☾ Fired —10^{x} Line centre.	Fairly smart work at this gun. Another —. B.C. probably creeping up.
	29	...	Detachments rear, relieved by other detachments.	Since Battery Flag up to 4th round 6′ 5″—average over 2′ per gun. Too slow.

There is often no time for many details to be entered, but in that case practice can usually be commended.

(8) Garrison Gunners should receive every encouragement to make themselves acquainted with the use of boats and launches, and to get accustomed to sea work and the management of targets. At many stations they have few facilities for this, and then targets are not run well. There are few more melancholy sights than a sea-sick helpless range party, while their records under such conditions are not trustworthy or full enough to be of much use. Officers should take such opportunities as may offer of seeing practice from our war ships, and the way in which ships are likely to manœuvre in attacking and firing. Many hints as to quick shooting may be picked up. Naval officers will often take an Artillery officer out to see quarterly practice on a wish being expressed; also in Torpedo Boats, which certainly teach the necessity of avoiding delay when using the smaller quick firers.

(9) Means are almost universally wanting for practising laying at night. Artillery will fail in night work, and especially with Q.F. guns intended to ward off torpedo boat attacks, if deprived of the means of lighting up the water area over which they fire. Each group of Q.F.'s needs a fighting light, or an enemy's torpedo boats will slip in with ease. It would probably be wise to hand over all lights which bear on water areas to the Artillery; but even if search lights and fixed beams are not so treated, gun fighting lights must be under the complete control of the Garrison gunners who are responsible for keeping the water areas covered by these guns free from intrusion.

In conclusion there may be some who might urge that firing at great speed may be all very easy at some places, but that it cannot be practised in localities where foul ranges are the rule and fair open water the exception. Such a plea for slowness should not be entertained for a moment. It is when practising over very foul ranges that the necessity for rapid smart work is made most manifest. Companies detailed to practice in such places are entitled to much sympathy, but it is frequently from want of decision and organization that their troubles arise. They are often kept for hours, more or less constantly at the guns, officers and men naturally getting slacker and slacker as time wears on without a round being fired, but nevertheless chance after chance of pouring in a few rounds is obviously permitted to escape; sometimes from doubt (not always illfounded) in the mind of the O.C. of his ability to instantly stop fire should danger arise; more frequently from slowness in some form or other, either on his part or that of some of those under him; or, what is perhaps a still more common cause of delay, want of practical experience, decision, and power of grasping the situation on the part of the Danger Officer. The latter holds a most

responsible post and needs as much training and practice for his work as anybody, for it is astonishing how many opportunities for firing with perfect safety a really smart and capable Danger Officer can offer to a battery of guns if he feels a confidence that those manning the guns will only respond instantly. Being a mere peace-practice official few hints are laid down for his guidance, but it repays a C.O. well to afford him every assistance in the shape of trustworthy look outs. When a good Danger Officer forecasts that a safe space for fire is likely to occur he lets the C.O. know that he will probably be able to raise his flag soon, and the latter should at once get all ready by causing range-finding operations to re-commence and, as the opportunity seems about to prove a good one, by assembling the men on the guns, so that almost at the instant that the flag goes up firing may commence. If fire is not always opened smartly a Danger Officer is apt to think it is not worth while to take advantage of brief openings and fails to raise his flag.

Keeping men more or less at attention at the guns, for considerable periods, when it is manifest that the range is foul is a fruitful source of slow firing and slackness. It is far better to dismiss them until they are wanted and rely on their being smart in answering to a call, encouraging them to enter into such little amusements as can be organized close to the guns. Unavoidable pauses during practice often afford an excellent opportunity for assembling detachments and criticising their performances up to that point, or for imparting theoretical knowledge and classifying gunners. Each Company will pursue its own method, but the smartest will be the Company which has managed to pitch most shell into the target in the shortest time available for actual practice.

THE GERMAN METHOD OF BRINGING GUNS INTO ACTION.

BY

COLONEL A. E. TURNER, C.B., A.-A.-G., R.A.

At the present time considerable divergence of opinion exists as to the best and safest method of bringing up guns into a fire position. With us it is the rule to do so by means of the horses, and to unlimber in the position itself without any regard to cover or exposure to the fire of the enemy. With the Germans, on the contrary, it is the custom, with certain permissible exceptions, to unlimber in rear of a fire position and to run the guns up to it by hand. I think, therefore, that perhaps my experiences of the latter artillery may not be altogether devoid of interest. In the non-official portion of the *Militär-Wochenblatt*, No. 88, 1896, appeared an article condemning the German system of "creeping" into position, as the writer sarcastically terms it. Among other objections, he urges that by seeking cover and running up the guns deliberately by hand, the infantry, when exposed to the fire of the enemy's artillery, would be left in the lurch, shattered and rendered incapable, owing to their heavy losses, of taking advantage of the victory of our guns over his and of completing any success gained by our artillery; or, as he puts it, "what good will it be to us if, when our artillery has subdued that of the enemy, our infantry has already been so shattered by the fire of his guns that it is incapable of completing the victory."

Surely this is a case of putting the cart before the horse. One of the most generally known and fundamental principles of latter day tactics is, that the fire of the hostile artillery must be subdued before the infantry advances to the attack, and that until it is subdued such attack is impossible. Again, as will be seen from the following extract of a letter from an eminent German artillerist, to whom I wrote for information on the subject, such a case, if it did happen, would be one of those exceptional ones, for which it is enjoined that guns are to be brought up to the firing position by the horses and there unlimbered and brought into action as speedily as possible.

The letter runs as follows:—

"With regard to your other question with reference to the method of coming into action, our rule is, that the guns are to be brought up to the firing position by means of the horses, only so far as the latter are under cover from the fire of the enemy, and that when that can

no longer be the case, the guns are unlimbered and run up by hand by the detachments. This is invariably done when coming up into action against the enemy's artillery already in position. If the latter is not the case, it is permissible to bring the guns up into the firing position without previously unlimbering. This, however, must be regarded as an exception to the rule. When, however, the fire of the enemy's artillery is nearly subdued, and when, in consequence, ours is not exposed to any great loss; when, moreover, we advance to a second or subsequent position to support the decisive infantry attack, then we bring up the guns into the firing position by means of the teams. This also is done in case of a pursuit, when it is all important to gain time. All these cases must, however, be regarded as exceptions to the rule, which is, that the horses are not to be exposed to the enemy's fire, and that the guns are to be unlimbered under cover and run up by hand by the gunners. The guns being unlimbered, the Nos. 1 run forward to the firing position and select the exact site for their respective guns, which are then run up by hand to them.

"With regard to what you say you heard took place at the Kaiser manœuvres this year, it was probably done in a case of pursuit, or in support of an infantry attack, in either of which cases the guns would have been brought up by the horses. In order, however, to fatigue the gunners as little as possible, the Battery Commanders are directed to reconnoitre the ground to their front most carefully, so that the batteries may advance under cover without unlimbering, as far as practicable, without being seen by the enemy; or in other words, that the distance over which the guns are run up by hand may be reduced to the utmost possible extent. This, of course, calls for a most careful and searching reconnaissance on the part of the Battery Commanders.

"In order to avoid observation from the enemy as long as possible, it is the custom in some artillery regiments to dismount the drivers, who lead the horses towards the firing positions as long as they can do so under cover; when this is no longer possible, the guns are unlimbered and run up by the gunners."

Personally, I have never seen any other method than this pursued by the German artillery, and I believe that the reports of all other English officers who have of late attended German manœuvres show that their experience has been the same as mine, with one exception. In this instance I have not seen the report, but it is said to have come from an officer who witnessed the Imperial manœuvres in Saxony this year (1896), and who stated that the artillery was always brought up to its fire position and there unlimbered. On the other hand, Lieut.-Colonel G. F. R. Henderson, Professor of Military Art and History at the Staff College, who was present at these manœuvres and who has probably attended as many manœuvres in Germany and written as exhaustively on them as anyone, has informed me and authorised me to quote him on the subject, that he never saw the German artillery at these Imperial manœuvres of 1896, or at any others, adopt any system but that described in the above letter.

During the manœuvres of the XIV. Army Corps in the Grand

Duchy of Baden, which I attended last year (1896), I made a point of enquiring from a number of artillery officers as to the reason and origin of their system of unlimbering under cover and running the guns up by hand. When I could I selected officers who had fought in the war of 1870–71 who had been exposed to artillery fire. Among others a Colonel commanding an artillery regiment, who was in the Artillery of the Guard, which, on the day of the battle of Sedan, advanced through Villars-Cerny and came into position between the Bois de Villars-Cerny and the hill above Daigny against the batteries of the I. French Corps (Ducrot), which were in position on the high ground on the other side of the Givonne, with their left near the Bois de Garenne, told me, that when they had nearly subdued the fire of the French batteries three batteries, one after another, came up the Fond de Givonne to reinforce the latter, in most gallant style, and that without any attempt at seeking cover they proceeded to unlimber in their selected fire positions. The three batteries were absolutely destroyed (*zusammen geschossen*) without firing one single shot! These batteries it appeared, from the French report, were ordered up by the Emperor himself. A similar fate befell several French batteries on the plateau de Floing at the hands of the artillery of the V. and XI. Corps.

"*Fas est ab hoste doceri*," and it was from such incidents as these that the Germans learnt how not to come into action against superior or anything like equally well armed and trained artillery.

Their rules on the subject seem as perfect as rules can be. They admit of exceptions in cases in which any Commanding Officer, who has a head on his shoulders, would make exceptions in real warfare; and, as is the German system in all military matters of the kind, they leave a great amount of latitude to the Officers Commanding to exercise their powers of initiative, their common sense and their capacity for taking responsibility upon their shoulders. Officers may be tied down strictly by academic instruction and hard and fast rules, but when the time for real action comes, while mediocre men will be hampered and their powers of judgment warped by the necessity under which they feel to act strictly in conformity with the regulations, the superior man will rise to the occasion and will adapt his conduct of operations to the existing circumstances of the situation in which he finds himself involved. Not that rules nor instruction, even academic, are to be deprecated; on the contrary, but as it is utterly impossible to establish regulations with such a wide margin as to be applicable to all cases, no two situations in warfare being exactly alike, so officers should be instructed, as German officers are, that while rules are laid down and formations prescribed for fighting under purely normal and theoretical conditions, they are by no means restricted from using their independent judgment and common sense according to the varying circumstances, which arise in war. For instance, no sane man, in command of artillery would, I think, expose his limbers and teams by unlimbering in the firing position when faced by the guns of the enemy already in position, if by unlimbering a short distance in rear of it, he can do so under cover, and by running up his guns by hand expose only perhaps the muzzles

to the view of his enemy, unless he courts the fate of those three French Horse Artillery batteries at Sedan. It must be borne in mind too, that though the German Artillery in their last war was very powerful, infinitely more so than that of their opponent, their projectiles were as nothing compared to the deadly shrapnel of the present day. Artillery which is already in position if any time at all has been available, will have ascertained with tolerable accuracy the distances to all likely conspicuous points and positions which the enemy's artillery may probably take up. This is laid down in the Field Artillery Drill Book, 1896, page 80, and in Part V. Infantry Drill, 1896, S. 118, for the artillery of the defence; and it must be borne in mind that it will be in a vast majority of cases the artillery of the defence that will be the "artillery already in position." Imagine, for instance, a brigade division bringing its eighteen guns up to the crest of an intended position, in full view of a line of guns, already in action at within 2500 yards; the latter artillery would be anything but efficient, if they did not succeed in rendering *hors-de-combat* a good proportion of the enemy's guns and teams, and if the latter are destroyed, the former are as good as lost for ulterior movements and action.

I witnessed a remarkable instance bearing on this subject on the last day of the corps manœuvres in Baden last autumn. The corps and divisional artillery of the Western Force came up in two columns and deployed under cover of a long roll of ground, they unlimbered behind the crest and ran the guns up by hand; the first intimation of their proximity and presence was the opening fire by 72 guns at a range of under 2000 yards, within which distance of them I was standing with the Eastern Artillery, which was already in position. The effect was judged to be annihilating, as the latter had but six batteries. How different might not the case have been had the former artillery exposed their limbers and teams on the crest of the position. We must consider too the effect on the men; had the warfare been real, directly the guns appeared, rapid fire would have been opened by the Eastern Artillery, and the Western would have had to come into action in face of a "feu d'enfer" with shells bursting about their ears, under which circumstances, the best soldiers at the beginning of a fight would become flurried and unsteady. As the operation was carried out, their was nothing to upset their nerves and they gained the inestimable advantage of taking the initiative and firing the first rounds; so that the nervous excitement, which must fall to the lot of those, about whose heads the first shells burst, was felt by the artillery which was first in position and not by that which came up to combat it.

On the other hand, if guns are brought up into a position which is not within the range of artillery or infantry fire, it seems to matter very little how they are brought up, and it would be the natural impulse of every sensible commanding officer to spare his gunners the labour of running up the guns by hand, provided he knew that the act of unlimbering in the firing position would not betray it and impart useful information to a watchful enemy.

It may be argued that the length of time during which the horses

and limbers are exposed is very short—too short in fact for the enemy to get the range and length of fuze. This was not the case at Sedan, where a number of guns, equal to those of one of our brigade divisions, were with their teams and limbers destroyed before a shot could be fired, and though, roughly speaking, they prolonged the line of Ducrot's guns to the left, in reality the position they took up, was some distance from the former, nor were they by any means in the same exact line. Directly they appeared the German Guard Artillery turned their fire, two or three batteries at a time, on the first, second and third French batteries in succession and merely judging distance and without any ranging, demolished them utterly. I do not think it is necessary to go further for an example to prove that it is suicidal to unlimber guns in a firing position in sight and within 2500 yards of the enemy's artillery which is already in position, when cover is obtainable.

In conclusion, I quote a few sentences from remarks of a German General, an eminent authority, upon the lecture 'Artillery from an infantry officer's point of view,' given by Captain Pilcher, Northumberland Fusiliers, at the R.A. Institution, Woolwich, on the 12th March last. These remarks were published in the "Proceedings" of the R.A.I. for January 1897. They appear, however, to be so apposite in this instance that I venture to reproduce them in this paper.

"I have just stated that direct fire was the rule, but every care should be taken to avoid exposing the horses of a battery when coming into position and only the muzzles of the guns should shew above the crest."

"Again, I have often seen 76 guns in position without more than the muzzle of a single gun being exposed."

"Before 1806 some few German officers, more advanced in thought than the rest, advised making use of ground and cover, but the majority, instigated by the same spirit with which some of the officers, taking part in the discussion, seem to be imbued, answered "What, shall the army of Frederick be made a school for cowardice! No, never." They refused to practise the use of the ground, and the result was Jena and Anerstadt. To say that to make use of ground in any way destroys 'der Geist der Waffe' (the spirit of the arm) is nonsense. I have already said that, 'Wirkung geht vor Deckung' (effect must be considered before cover), but this is 1896 not 1870, and the effect of infantry fire must be multiplied by four or by six in comparison with what it was in 1870, and what is the good of artillery coming up close, if by doing so the effect of its fire is not greater. The effect of artillery fire is equally great at 600 or 1200 yards, but if under infantry fire, their losses at the former distance would be enormously greater; another point to consider is that if you come too close you cannot feed your guns, for your ammunition carriers will be all shot."

That great authority, General von Goeben, says "Artillery is a fine instrument, which must not be put into the first line except under most exceptional circumstances."

There are two ways of teaching men, you can teach them to be

"dumm dreist" (bold through ignorance) to disregard cover and to believe that there is nothing to fear if they keep a bold heart. The other system is to teach men what dangers there are and to avoid them, just as a sailor or a steeplejack is taught to appreciate and how to avoid the dangers of his trade. Men trained on the former system find out on the first day of battle that their teachers have been in error and they lose all confidence in them. Such teaching may sound excellent in peace, but will not stand the strain of war. The second will stand any test."

I should be very sorry indeed if it were supposed that I wish to imply any slur upon our system as taught at Aldershot, Shoeburyness and Okehampton under artillery officers, who could not be surpassed in ability and knowledge of their profession in this or any other country. I give my ideas and the result of any experience for what they are worth. It is the inevitable result of a very long peace that theory should hold the field, because the practical is impossible except in actual warfare, when the all important factor of human emotions is brought into play and when misconceptions and errors of judgment soon became apparent, and lessons are speedily taught at the cost of blood.

COLONEL JAMES WEMYSS, MASTER-GUNNER OF ENGLAND, 1638-1666, AND GENERAL OF THE ARTILLERY IN SCOTLAND, 1649-1667.

BY

CHARLES DALTON, ESQ.,

Editor of English Army Lists and Commission Registers, 1661–1714.

In the winter of 1629–30 a small family party arrived in London, from Scotland, and applied for a grant of denization to enable them to enjoy the privileges of citizens. The party consisted of Colonel Robert Scott, Anne his wife, Charles and Anne his children, George Scott his brother and James Wemyss his nephew.[1] At the time we write of Scotchmen were by no means popular in London. In 1603 James I. had brought a goodly company of his compatriots to London when he came to take possession of the promised land—and many more travelled the same road in succeeding years. The English in general, and the Londoners in particular, looked with the same disfavour on these Scotch fortune-seekers that was shown by the population of the Southern States of America to the "Northerners" who swooped down like vultures to take possession of the posts and offices rendered vacant by the rebellion of their vanquished brethren. But whether welcome or not the Scotch came to London and prospered. On 20 February, 1630, a grant of denization was given to Colonel Robert Scott and his little party.[2] Who this Colonel Scott was does not appear, but we find him awarded a pension of £600 per annum out of the Court of Wards a few months later. It is, however, his nephew James Wemyss with whom we have now to deal. This remarkable man was a direct descendant of Sir David Wemyss of Wemyss, County Fife, whose father fell at Flodden, and an ancestor of the present Earl of Wemyss. From an early age James Wemyss had devoted himself to military studies and had shown a marked genius for the science of war. Gunnery, and all that appertained thereto, had a special charm for him and he turned his inventive and mathematical brain to the improvement of artillery which had, hitherto, made but little advance in England. On the 25 February, 1634, we find the King granting a Royal Warrant to Sir John Heydon, Lieut.-General of the Ordnance, "for making such a butt and platform at Foxhall [Vauxhall] as is at

[1] *S.P. Dom.*—20 February, 1630.

[2] *Ibid.*

the artillery garden."[1] And on the following day we find another Royal Warrant to Sir John Heydon "for carrying such quantity of earth to Mr. Wemyss' garden at Foxhall as should suffice for making a butt to prove ordnance at and likewise to furnish bricklayers for some brick-work for the same."[2] Encouraged by the patronage of his sovereign, Wemyss pursued the even tenour of his inventive life for another three years when he had the misfortune to have his house at Vauxhall burnt down. This misfortune deprived him of his scientific instruments and the tools he had acquired, at his own expense, for the furtherance of his inventions. He also had acquired considerable debt which pressed heavily upon him. At this crisis (1637) Wemyss addressed a humble petition to Charles I. which sets forth :—

"That he hath taken much pains, and been at great charges, in performing of several orders which your Majesty hath been pleased to give him from time to time this seven years by past, the particulars of which he put in divers proportions, and gave to your Majesty, offering to make them good before a Council of War which your Majesty hath been graciously pleased to approve at his suit, but the petitioner sees no appearance of their meeting to determine upon the business, before your Majesty returns from Progress, which hath caused your petitioner to be grievously dealt with by his creditors insomuch that he is in great danger to be cast into prison. Your Majesty would be pleased to remember of a bill of his disbursements which he gave you, before his house was burnt down, of about £1,100. . . . . Your petitioner hath likewise been at great charges these two years past in repairing, or making, instruments and tools which he lost by fire; also for furnishing materials for performance of those charges which he lately showed your Majesty. The petitioner prays that he be not in a worse estate than the mackannikest [mechanicalest?] man that serves the King as he has these seven years, without receiving one penny, which will redound to his utter ruin if your Majesty take not a speedy way for payment of his debts which amount to above £2,000."[3]

This petition is endorsed :—

"At the Court at Greenwich, 9 July, 1637. His Majesty is pleased to refer this petition, and the annexed account, to the Lord Treasurer who is to consider thereof and, making such abatement as his Lordship shall find fit, to give order for Privy Seal for a speedy payment of the rest to the petitioner."

Brighter days were coming. The following year James Wemyss was appointed to the honourable, and responsible, post of Master-Gunner of England, for which he was in every way fitted. On 10 September, 1638, we find him appearing with Sir John Heydon before the Council "concerning a dwelling-house and the artillery garden where his Majesty's feed gunners and others practice to discharge

[1] *S.P. Dom.*—25 Februarv, 1634.

[2] *Ibid.*—26 February, 1634.

[3] *S.P. Dom.*—1637.

ordnance."[1] It appears that the said house and garden were granted by Letters Patent to the Lieutenant of the Ordnance; but, notwithstanding this right, "it was affirmed by several ancient men" that this particular house and grounds "have for many years been enjoyed by the Master-Gunner of England." Wemyss' claim ended by Sir John Heydon promising to deliver possession to the former as in obedience to the King's command, reserving still his right.[2]

Stirring times were now at hand. England was on the brink of a rebellion of gigantic magnitude and doubtful result. Those who expected the coming storm saw the necessity of being prepared. On the 12 February, 1639, we find Wemyss again petitioning the King. This time it was "for the same proportion of annuities which his predecessors formerly had for providing powder and ammunition, and a place where to practise the elevation with great ordnance and use of the mortar." The petitioner supplements this request with this seasonable warning:— "Petitioner regrets to say that there are few gunners in your Kingdom, at this time, who understand the several ranges of ordnance, or use of the mortar, which, in effect, are the special points belonging to a gunner and impossible to attain unto without a great and continual practice."[3] The army levied in 1639 to march to Scotland, and overawe the Scots, attempted nothing which was perhaps fortunate for the army in question. The following spring another army was levied and Wemyss was appointed to a command in the same. We gather this from the notes by Secretary Nicholas of business transacted at the Council of War, 30 January, 1640, in which notes is the following: "Secretary Windebank to move his Majesty for Mr. Wemyss, the Master-Gunner of England, and to give him his Majesty's command that he serve in the present army for the same pay he was listed to serve the last year. The train of artillery is settled and ordered to be drawn up by the Office of Ordnance."[4] Time rolled on and the whole Kingdom was split into two factions—Royalists and Parliamentarians. Wemyss cast in his lot with the latter and his military ability procured him the post of Master of the Ordnance to Sir William Waller. On 29 June, 1644, Waller found himself opposed to the Royalist forces commanded by the King in person and at Cropredy, near Daventry, a battle was fought which is known in history as the battle of Cropredy Bridge. The Earl of Clarendon, in his graphic account of this sanguinary engagement, tells us that the Earl of Cleveland, who commanded a brigade of Royalist horse, routed Waller's horse and foot "and chased them with good execution beyond their cannon, all which, being eleven pieces, were taken; with two barricadoes of wood, which were drawn upon wheels, and in each seven small brass and leather guns, charged with case shot; most of their cannoneers were killed and the General of their Ordnance taken

[1] S.P. *Dom.*—10 September, 1638.

[2] *Ibid.*

[3] *S.P. Dom.*—12 February, 1639.

[4] *Ibid.*—30 January, 1640.

prisoner. This man, one Weemes [*sic*], a Scotchman, had been as much obliged by the King as a man of his condition could be, and in a manner very unpopular, for he was made Master-Gunner of England, with a pension of £300 per annum for his life (which was looked upon as some disrespect to the English nation), and having never done the King the least service, he took the first opportunity to disserve him; and having been engaged against him, from the beginning of the Rebellion, he was now preferred by them, for his eminent disloyalty, to be General of the Ordnance in the army of Sir William Waller, who was very much advised by him in all matters of importance."[1]

The following extracts from letters sent by several of the most eminent Parliamentary generals, to the "Committee of Both Kingdoms," anent the imprisonment of Colonel James Wemyss clearly prove how highly his services were thought of by the writers in question. Lieut.-General the Earl of Essex writes on 15 July, 1644: "If you would take it into your care to have Colonel Wemyss speedily exchanged it would be a great advantage to Sir William Waller's army, otherwise his train of artillery may be in some disorder; besides I am informed that when brought to the King, he told him (Wemyss) as yet he had not disposed of his place which makes me believe that no art will be left untried to win him over to the enemy, and though I hope his honour will preserve him, yet a man of his abilities is not to be lost."[2] On 2 October, 1644, we find Sir John Meldrum busying himself to secure the release of Colonel Wemyss. "I proposed," wrote Meldrum, "to Sir Thomas Tillisley [Tyldesley[3]] who hath been Major-General, and Colonel of foot, that if he would procure Colonel Wemes his liberty I would use my best endeavours to set him (Sir Thomas) free." This plan fell through as Tyldesley was thought too important a captive to be exchanged even for Wemyss and, on October 8 following, Sir William Waller and Sir Arthur Hazelrigg wrote "humbly desiring that Major-General Porter may not be exchanged for any other but Colonel Weyms." It is uncertain when Wemyss obtained his release but, on 12 June, 1645, we find a Colonel James Wemyss' signature attached to a Memorial for arrears of pay due to him and 130 Scotch officers then in England.[4] And in December 1846, we also find an order for £50 made at the Committee of the Navy "upon petition of James Wemyss, Master-Gunner of England, who having faithfully served the Parliament ever since the commencement of these troubles, when the other officers deserted their trust, and proved all the ordnance and gunpowder for the navy and fitted the ships with them, particularly this last summer when 100 pieces were prepared for the three new frigates."[5] The same sum was voted him by the Navy Commissioners

[1] Clarendon's *Hist. of the Rebellion* (edit. Oxford, 1706), Vol. IV., p. 499.

[2] *S.P. Dom.*—15 July, 1644.

[3] On 5 July, 1643, this officer forced the bridge of Burton-upon-Trent, when conducting Queen Henrietta Maria from Bridlington to Oxford, by a desperate cavalry charge. It was on this occasion that Lieut.-Colonel John Dalton (the writer's ancestor), who was with the Queen's escort, received a mortal wound from the effects of which he died on 24 July, 1644.

[4] *Historical MSS. Commission.—Report on the Duke of Portland's MSS.* Vol. I., p. 227.

[5] *S.P. Dom.*—1 December, 1646.

in March, 1648, for similar services in the summer of 1647.

In March, 1648, Colonel Wemyss returned to Scotland, and on 27 of the same month an Act was passed by the Scottish Parliament "granting to Colonel James Wemyss the privilege of making leather ordnance for three terms of nineteen years with power to enforce secrecy." The aforesaid Act specially mentions the fact that Colonel James Wemyss "hath come to his native country with the intention of using his utmost endeavour to its service" and that he "intends to put divers inventions in practice of which he hath elsewhere brought to perfection." We have already heard of the leather guns being used at the battle of Cropredy Bridge and we shall presently hear of them again. About this time (1648) Wemyss appears to have veered round to the side of the King. We gather this from the notice of his services in Douglas's *Peerage of Scotland*, where it is stated that the inventor of the leather guns for field service "was deprived of his office by Parliament for his concern in the engagement to rescue the King in 1648."[1] Whatever amount of truth there may be in this statement certain it is that Colonel Wemyss left England very hurriedly in the spring of 1649, and his post of Master-Gunner of England was bestowed on Richard Wollaston. The Scotch, who at the eleventh hour had become Royalists, received their distinguished countryman with open arms and on 10 July, 1649, an Act nominating Colonel James Wemyss to be General of Artillery, in the room and place of Colonel Alex Hamilton, was passed by the Scottish Parliament. His pay was fixed at 600 Scots marks per month and he was given, in addition, the command of a regiment. In his new capacity, Wemyss served with the Scottish army at the battle of Dunbar,[2] 3 September, 1650, on which occasion the Scots were routed with great slaughter by Cromwell. Many leading Scots officers were taken prisoners, but the General of Artillery had the good fortune to escape capture, although 30 guns fell into the hands of the conquerors. Recovering shortly from this defeat, the Scots determined to march into England hoping that many of the English nobility and gentry would flock to join King Charles II. who accompanied their army. A fresh train of artillery was formed and Wemyss appears to have been allowed *carte blanche* in fitting the train to take the field. On the last day of March, 1651, we find the Scottish Parliament ordering £12,000 to be paid to their General of Artillery. "The King's army," writes Lord Clarendon, "was as well modell'd and in as good a condition as it was like to be whilst he stayed in Scotland. By the time that Cromwell was ready to take the field his Majesty was persuaded to make David Lesley his Lieut.-General of the army. . . . . The artillery was in very good order under the command of Wemmes [*sic*], who had not the worse reputation there for having been ungrateful to the King's father. He was a confessed good officer."[3] The fate of this fine army is a matter

[1] Douglas's *Peerage of Scotland*. Vol II., p. 619.

[2] *Harleian MSS.*, 6844, folio 123.

[3] Clarendon's *Rebellion*, Vol. VI., pp. 396-7.

of history. Wemyss was taken prisoner, with many of the Scots officers, after the battle of Worcester and the next time we hear of him he is a prisoner in Windsor Castle. In his case—

> "Stone walls did not a prison make,
> Nor iron bars a cage,"

for he employed his time in planning new inventions and perfecting old ones. On 25 June, 1652, the Council of State permitted Colonel Wemyss, "prisoner at Windsor Castle, to go to London for a month on giving security in £2,000 to render himself prisoner at the month's end, either at Windsor or such other prison as Council shall direct."[1] Five months later the Council, on petition of Colonel Wemyss, ordered him "to be examined, and bailed if it was thought advisable."[2] For five and a half years we have no information whatever as to James Wemyss and his affairs. It is not until 27 May, 1658, that he again appears upon the scene and this time it is as a petitioner craving favour at the hands of Oliver Cromwell :—

"Petition of James Wemyss, late General of the Artillery of Scotland, to the Protector. Has composed and put in practice certain inventions of light ordnance and engines of war, the heads whereof are in the propositions annexed, the fruits of his study and labour for 30 years. Has been careful to keep them secret, and begs that he may draw them up into an Act to be passed next Session, and to that end, that the Protector would take off all incapacities, which will enable him to provide a place forthwith to erect his works, and to make other necessary preparations. Annexing—

"Note of the said inventions, of which he will give proof at his own charge, the carriage excepted, and only asks an extension to England and Ireland of the benefit of the Act of Parliament granted him for Scotland :—

(1.) "Of small pieces of the weight of muskets, shooting ½ lb. bullet of lead, with rests or carriages, saving soldiers from the recoil and forming a good barricade against cavalry; 60 horses will draw as many as shall serve 1000 of their pieces with ammunition for 4000 shot.

(2.) "Pieces carrying 1 lb. of iron and doing the execution of 3 lbs. 12 mounted on a carriage serving as an ammunition waggon for 300 shot, with a platform on which the pieces remain always mounted, ready to be fired right or left without taking the horses out; three men to manage the 12 pieces and three horses to draw the carriages with ammunition. Men can be taught to use them sooner than to use the musket, etc.

(3.) "A chariot or waggon to carry 6 or 8 of them so mounted that the gunner in it, at passes and narrow ways, shall give fire continually in front without hurting the horses.

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[1] *S.P. Dom.*

[2] *Ibid.*

While one gunner takes aim, another can load two pieces. Three horses will draw all, with ammunition for 120 shot.

(4.) "Pieces to carry 3 lbs. shot, 2 of which, with 4 others of 1 lb., can be mounted on one carriage, weighing altogether 4 cwt. Four of these 3-pounders to be mounted on one carriage to weigh 5 cwt. with three men to manage either carriage.

(5.) "Sakers of 4 or 5 cwt. and demi-culverins of 6 cwt., like brass drakes and doing as much execution, lasting as long and able to be discharged as often; and each with four 1-pounders on the same carriage. . . . Their price not more than brass ordnance.

(6.) "An invention to put a ship in such defence that she cannot be taken by force, by assault, or boarding, so long as she has 30 men for her defence, unless his engines are dismounted and broken by chance shot.

(7.) "An invention whereby a ship may be built with two whole decks, half and quarter decks of the dimensions of the *Naseby* frigate, especially in length; to carry, besides her lower tier of brass or iron, 100 of the aforesaid 3 and 6-pounders, 100 men being sufficient to manage them.

"If those appointed to ply them on the upper deck are forced to quit them, the enemy cannot in half an hour cause one piece to bear on any part of the ship, whereby to force a surrender. In less than a quarter of that time the deck shall be cleared, though hundreds were upon it, without endangering the ship. Those of less burden to carry a proportionate number; those already built and fitted with ordnance may, with small charge, be made to carry half as many more."[1]

This petition was read in Council,[2] but it had no further result. Cromwell passed away a few months later and his successor, that affable nonentity, Richard Cromwell, had no taste for the "engines of war." The Restoration brought about a better state of things for Wemyss. He was restored to his post of Master-Gunner of England notwithstanding the protest of Thomas Taylor, Master-Gunner of the ship *Sovereign*, who applied for Wemyss' post, pointing out that the Colonel had borne arms for the Parliament.[3] Wemyss was also re-appointed General of Artillery in Scotland and, on 1 March, 1661, a new Act was passed in his favour by the Scottish Parliament, granting him the privilege of making, selling, and exporting to friendly countries, leather ordnance for three terms of nineteen years from the date of the

[1] *S.P. Dom.*—27 May, 1658.

[2] *Ibid.*

[3] *Ibid.*—June 1660.

passing of said Act.[1] Two years later, Charles II. granted a patent "to James Wemyss, senior, and James Wemyss, junior (son of the former) of the invention of the former for making light ordnance, and of a way whereby all motions caused by the force of a river, wind, or horses, may be done by one or two men and may be useful for lifting of weights, draining of mines,[2] etc." This patent was the result of an exhibition by Colonel Wemyss of his "light ordnance" before a Council of War at which the King was present. In 1666 Wemyss left England for good and took up his abode in Scotland. On 24 August same year we find a "Petition of James Wemyss, General of the Artillery in Scotland, to the King, to have the sum which he is to receive, as promised, for the office of Master-Gunner of England, disposed of by his Majesty to another person, and to order the same to be paid quarterly, from the Ordnance Office till the whole is paid."[3] This petition was received on 18 January, 1667. We gather from a letter sent by Sir Jno. Duncombe and Thomas Chicheley to Lord Arlington, dated 28 December, 1667, that Colonel Wemyss died in December 1667. The letter in question "requested a warrant for a grant of the office of Master-Gunner of England to Captain Valentine Pyne, who executed it for some time in place of Colonel James Wemyss, engaged in other services in Scotland, the said Colonel being now dead."[4] On 31 January, 1668, we find a "grant to Captain Valentine Pyne of the office of Master-Gunner in the Tower, fee 2s. a day, drawing pay from the death of James Wemyss."

About the year 1639, Colonel James Wemyss married Katherine, widow of John Guilliams, by whom he had a son and four daughters. This lady was the daughter of Thomas Rayment, poulterer, of St. Botolph's parish, Bishopsgate, and at the time of her first marriage, viz., in 1632, was 17 years of age. By John Guilliams, who died in 1638, she had one son. The child was brought up by Colonel Wemyss with his own children, and on the death of his wife, in February 1649, he became legal guardian to young Guilliams, who was entitled, in right of his own father, to certain property at Walthamstow in Essex. Before leaving London, about Ladyday 1649, Colonel Wemyss appointed a certain Robert English as guardian and trustee to his children and step-son, whom he was to educate and bring up in the Colonel's absence from England. The lot of this trustee was certainly not a happy one. He was left £500 in hand, but Wemyss had not long left London before English had to pay £480 upon two judgments against the Colonel. And in June, 1651, the house property at Walthamstow was ordered to be sequestered on account of "the delinquency of James Wemyss, now in Scotland, in service of the army against the State." The rent from the Walthamstow house property was the only certain income English had to depend on, and he appealed, as guardian

[1] *Acts of the Parliament of Scotland.*

[2] *S.P. Dom.*—March 1663.

[3] *Ibid.*—24 August, 1666.

[4] *Ibid*—28 December, 1667.

to Colonel Wemyss' children and step-son, against the sequestration of this property. In this appeal, he declares that "since the said Colonel's departure he has only received £54 10s. 9d. on the account of said Colonel—*nothing else save a bird cage and child's stool!*"[1] It was not until 28 December, 1653, that English's title to the Walthamstow rents was allowed and the sequestration taken off.[2]

Mention has already been made of James Wemyss, junior, the Colonel's son and heir. He was associated with his father in the patent granted to Wemyss by Charles II. for making and selling light ordnance, etc. At his father's death, in 1667, young Wemyss became the sole patentee. He resided in Scotland and, according to Douglas's *Peerage of Scotland,* owned the estate of Caskyberry, which property came into the family by the marriage of James Wemyss, 3rd son of Sir David Wemyss, of Wemyss, with Janet Wardlaw, heiress of Caskyberry. On 15 April, 1672, James Wemyss was created Baron Burntisland for life. He married Margaret Countess of Wemyss in her own right and at his death, in 1685, left a son David who, in 1705, succeeded his mother as 3rd Earl of Wemyss. It is interesting to know that in 1689 the Countess of Wemyss claimed, and was allowed, her right to "sell and transport leather guns forth of the Kingdom with the first conveniency at her option."[3] It is on record that the leather ordnance, made and patented by Colonel James Wemyss, were used at the battles of Cropredy Bridge, Dunbar and Worcester;[4] also at the defence of Stirling Castle, in 1651, where General Monk found eleven leather guns when the Castle surrendered.[5] They were likewise used in the Scotch engagements of Gouger fight and Lairber bridge.[6] And at the battle of Killiecrankie, we are told that Dundee, by a desperate and successful charge on the artillery, *which consisted of three pieces of light leather artillery,* captured the same.[7]

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[1] *Calendar of the Committee for advance of money. Dom.*—1642–1656. Part III., p. 1348.

[2] *Ibid.*

[3] *Notes and Queries,* 8th Series, Vol. IX., pp. 365–6.

[4] *Ibid.*

[5] *Report of Colonel Moncke, Lieut.-General of the Ordnance, to Lieut.-General Cromwell.*

[6] Recited in Colonel Wemyss' patent of March 1661.

[7] Macpherson's *Original Papers.* Vol. I., pp. 369–372.

CAPTAIN BOGUE AND THE ROCKET BRIGADE.

COMMUNICATED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

Towards the end of 1895, the Saxon War Minister, General von der Planitz, in a conversation with Colonel H. J. F. Shea, (late R.A.) remarked that in the cemetery at Taucha (4½ miles from Leipsic) there was the monument to an English officer, who was killed at that battle on October 18th, 1813, and that it was in a neglected condition. In consequence of this information, last April, Colonel Shea with Major Addison (late R.H.A.) went from Dresden to Taucha, called upon the rector of that place, Herr Oberpfarrer Kuhn, and accompanied by him, visited the cemetery where they found and examined the monument, which bears in English and German the following inscription :—

"Let those journeying hither behold this stone.
The memorial alike of private worth and military glory."

Sacred to
Richard Bogue, Esq.,
a native of Hampshire in England,
and Captain in his Britannic Majesty's Regiment of Royal Horse Artillery,
who fell in the 31st year of his age
gloriously fighting for the combined cause of
Germany and her allies,
at the battle of Leipsic, on the 18th of October, 1813,
while commanding the Congreve Rocket Brigade,
having by distinguished services at the village Paunsdorff
borne a most conspicuous part
in the victory of that memorable day.
As a soldier,
he united professional science with the most ardent valour,
and in private life,
as a husband and a father,
(leaving a widow with two infant children)
he afforded a model for every domestic virtue.

That this distinguished officer therefore
may live beyond the grave,
his countrymen who have since visited this spot
where his remains are interred,
have at their own voluntary expense
dedicated this memorial to his respected name.

The history of the monument is contained in a document among the Taucha church records, dated 1837, of which the following is the substance.

On October 9th, 1814, two English merchants, Messrs. G. Holy and J. Drabble, who were in Leipsic during the annual fair, visited the field of battle and the grave of Captain Bogue. The former, who spoke German fluently, said it was unseemly that an Englishman so worthy should be quite unnoticed, and that they proposed to erect a monument to him by national subscription. This visit was followed a week later, during the days when the anniversary of the battle of the previous year was being commemorated, by that of six other English gentlemen with the Leipsic merchant, Herr Wagner. After consultation, they selected from several submitted, a suitable design for a monument, and arranged for its erection. All present were charmed with the rare patriotism which is characteristic, in so great a degree perhaps, of only the English nation. A contract was eventually signed in August 1815, and the work was completed in the following November, "forming," says the then rector of Taucha, Herr Oberpfarrer M. Johann A. Seyfast, "an especial ornament to our churchyard."[1]

It may be of interest here to mention the names of the officers who are buried on either side of Captain Bogue, both of whom were killed on the same occasion. On one side there is a monument to Herr Gotthard Johann, Graf Manteuffel, Major-General in the Russian service, chief of the Petersburg Dragoon Regiment and knight of several Orders, who was killed by a cannon shot. And on the other side (though without a monument) is the grave of Herr Frederick Baron von Kleist, cornet in the Russian Polish Lancer Regiment, in the squadron of Count Luxemburg, a native of Kerklingen in Courland, who was killed (aged 21) by a grape shot wound in the thigh.

During last summer, Captain Bogue's monument has been put in a state of thorough repair; taken to pieces, the stones re-pointed, and, without interfering with their colour, dressed with a solution to resist the effects of the weather, as well as being painted, while all chips have been filled up. The ground, which had sunk on one side, has been levelled and the monument slightly raised and brought forward. The following inscription has been added:—"Restored by members of Captain Bogue's family and officers of the Royal Artillery, August 1896."[2] The accompanying sketch shews the monument as at the present time.

The thanks of all who are interested in, and have contributed to the restoration are due to Colonel Shea and to Herr Oberpfarrer Kuhn, rector of Taucha, who have devoted much time and pains to the efficient execution of the work.[3]

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[1] Not including the marble slabs on the sides of the monument which came from England, the cost of its erection was £63.

[2] Subscriptions have also been received from Field-Marshal Sir Frederick Haines, G.C.B., and Colonel Horace Montague. The restoration has cost £15 5s.

[3] After all expenses were paid, Colonel Shea was glad to have a sufficient balance to enable him to send a little souvenir to Rector Kuhn and his son, for the trouble and interest they had taken in superintending the restoration of the monument. On its receipt the former wrote as follows:—

"To my brief acknowledgment of the receipt of your parcel, I beg now to add a more full expression of my thanks, which would have reached you long ago had I been able to find the necessary time for writing. Even to-day I am very much occupied, but I am most anxious to express my gratitude and so will no longer delay.

Of the services of the Rocket brigade at Leipsic, we have a good account from a letter written by the aide-de-camp of Lieut.-General Sir Charles Stewart, K.B., Lieutenant John Jones, to Captain Bogue's father-in-law, John Hanson, Esq., of Great Bromley Hall, and of the Rookery, Woodford, Essex, and which is now in possession of the widow of Captain Bogue's son, Mrs. Richard Bogue.[1]

BATH, November 11th, 1813.

DEAR SIR,—

"A duty, most melancholy in its nature, and peculiarly painful to myself, has devolved on me, in making you acquainted with the death of Captain Bogue,[2] which melancholy event happened on the 18th of October, in the victory gained by the Allies over the French in the neighbourhood of Leipsic.

Out of respect to the feelings and for the sake of the family of Captain Bogue, I have to regret that this melancholy task has not fallen to the lot of one, who, in entering into the mournful particulars, would be better able than I am, to set forth in the strongest light the consolation that will most undoubtedly be derived from an exit the most honourable—even the most glorious. But if the afflictions of relatives and the regret of friends are to be soothed by the reflexion that a duty has been honourably performed, by the conviction that every act of posthumous justice must be rendered to those exertions which contributed in no slight degree to the success of that memorable day, then are the friends of Captain Bogue in possession of a consolation so often wanting in similar events.

The Rocket brigade, under the command of Captain Bogue, had been attached in its general movements to the body-guard of the Crown Prince of Sweden, under the command of Colonel Lievitson, with, however, the understanding that on days of action it was to be more at liberty than that corps, and subject only to the direction of Captain Bogue. Conformably with this arrangement, at the commencement of

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The handsome gift of the family of Captain Bogue far exceeds my merits in the matter of the restoration of the monument. It is true I have used every effort to see the work carried out according to your wishes, but it gave me pleasure to do so in my interest in so good a cause—without the least expectation of a reward. And now to receive so rich an acknowledgment of any efforts of mine! Accept my most sincere and respectful thanks for the acknowledgment in word and deed bestowed upon me, and allow me to beg you to kindly forward these thanks to the descendants of the hero who rests in our God's acre.

I am much affected by the honoured family in England rewarding me so highly for the small service I have done. As a rule such gifts are not used, but carefully preserved as a highly valued memorial. I, however, have resolved to drink daily out of this charming goblet, in remembrance of the gallant officer who died fighting bravely on a strange soil—of his amiable descendants who have rewarded a small service in so generous a manner—of the honoured gentlemen of Great Britain with whom I, by this matter, have been brought into contact in so agreeable and pleasing a way. May God bless all the living—with the deceased be peace, and the Eternal Light shine upon them.

My son also expresses his deeply felt thanks for the valuable pencil, and begs that his little piece of work, although done with much interest, may not be overvalued. The precious gift will be a valuable remembrance to him of one who is a brilliant example to every able soldier.

I close with the most grateful greetings to you and hope to greet you both in Taucha in the coming year."

[1] It is much to be regretted that on May 23rd last Mrs. Bogue died after a few day's illness.

[2] Kane's List, No. 1015. Captain Bogue served as 2nd Captain of 'B' troop R.H.A. in the Coruña campaign in 1808.

the action on the morning of the 18th, Captain Bogue addressed himself to General Winzingerode, commanding the advance of the Crown Prince, expressing his desire to see the enemy, and requesting permission to engage. The General, much struck with the gallantry and spirit of the address, granted as a guard a squadron of dragoons, and requested Captain Bogue to follow his own plans and judgment. Captain Bogue lost no time in advancing to the attack of the village of Paunsdorff, then in possession of five of the enemy's battalions, upon whom he opened, in advance of the whole army, a most destructive fire. This was returned by musketry, and for some time a very hot combat ensued, when the enemy, unable to withstand the well directed fire of Captain Bogue's brigade, fell into confusion and began to retreat.[1] Captain Bogue, seizing the moment, charged at the head of the squadron of cavalry, and the enemy, terrified at his approach, turned round, and taking off their caps, gave three *huzzas*, and every man, to the number of between two and three thousand, surrendered to the Rocket brigade, which I believe, did not exceed 200 men.[2]

The intelligence of this success being communicated to the Crown Prince, he sent his thanks to Captain Bogue for such eminent services, requesting at the same time that he would continue his exertions; and the brigade proceeded in consequence to the attack of (I believe) the village of Sommerfeldt still further in advance. Sir C. Stewart accompanied the brigade and I was of the party. The situation taken up on the flank of the village was exposed to a most heavy fire, both of cannon balls and grape shot from the enemy's line, and from the riflemen in the village. A ball from the latter soon deprived us of the exertions of poor Bogue; it entered below the eye and passing through the head, caused instantaneous death.

You will see, I am sure, how impossible it is for me to say anything that can do justice to such actions. I had long been happy in the acquaintance of Captain Bogue; and no one, I am sure, more sincerely than I do, regrets the loss of a man whom I was most proud to have it in my power to call a friend and a brother soldier. It remains for me

[1] We learn from a memorandum presented in May, 1815, to the Duke of Wellington, concerning the armament with both guns and rockets of the 2nd Rocket troop, that when entirely equipped with rockets, their mode of use had been "to employ that arm on proper occasions in salvoes projecting 20 shells and case shot or even more; and in favourable ground even double that number, a mass of fire which, when judiciously used, must be productive, as at the battle of Leipsic and on the Gourda, of the greatest physical and moral effect, both from the novelty of the weapon, the extraordinary and appalling noise accompanying its flight from the first moment of ignition to that of the explosion of the projectile, and from its visibility during the flight."

[2] Lieut.-General Charles William Vane, Marquis of Londonderry (formerly Sir C. Stewart), in his narrative of the war in Germany and France in 1813 and 1814, speaks thus of the rockets at Leipsic:—

"Congreve's formidable weapon had scarcely accomplished the object of paralysing a solid square of infantry, which, after our fire, delivered themselves up, as if panic struck, when that estimable man and gallant officer, Captain Bogue, of the British Royal Artillery, received a mortal wound in the head, which at once deprived society of a noble character and this country of his valuable services. Lieutenant Strangways,* who succeeded in the command of the brigade, received the Prince's Royal thanks, conveyed through me, for the important assistance they had rendered. I felt great satisfaction at witnessing, during this day, a species of improved warfare, the effects of which were truly astonishing and produced an impression upon the enemy of something supernatural."

* Kane's List, No. 1365.

to tell you that the body was found a few hours afterwards, and decently interred the next morning at the town of Taucha, about two miles from Leipsic; all the brigade attending with the deepest regret the melancholy ceremony.

With regard to the horses and effects of Captain Bogue, I hope on my return you will have the frankness to make me, without ceremony, the instrument for putting into execution any arrangements you may desire.

I trust the sufferings of Mrs. Bogue are not so severe as you feared they would be. May I request to have my respects presented to her and believe me, etc., etc.,"

JOHN JAMES.

In 1814, the Crown Prince of Sweden (Bernadotte) acting through Mr. Thornton, H.M. Minister at Stockholm, sent the Swedish Order of the Sword to the widow of Captain Bogue, in recognition of his services, at the same time making a most generous offer to do anything in his power to assist the family, should it be desired.

It will not be out of place here to mention that the effects produced by the Congreve rockets at the battles of Goerde or Görde and Leipsic had been so marked by success, that in January, 1814, two rocket troops were formed. The first was at Woolwich, while the Rocket brigade became the 2nd. In May, 1815, the Prince Regent, in recognition of the distinguished services of the latter at Leipsic, directed that that name should be borne on the helmets and appointments of the troop. After some further services in Germany[1] it was attached to the force, under Lieut.-General Sir Thomas Graham, in Holland until the summer of 1815, when it joined, near Brussels, the army under the Duke of Wellington. In the retreat from Quatre Bras the rockets were used with effect,[2] and in the battle of Waterloo the troop bore a distinguished part.[3] Lieut.-Colonel Augustus Frazer, R.H.A., wrote:—"The rockets were used and were useful I am told. I did not see their application, the Duke never having gone more to the left than the intersection of our centre by the pavé, which was in a

[1] These were as follows:—
The siege of Fort Frederick, which capitulated December 19th, 1813; the siege of Glückstadt, which capitulated January 5th, 1814; the siege of Wittenberg, which lasted some time. During this siege the battle of Görde was fought on September 16th, 1813, consequent upon a force from the 13th French corps, under General Pecheux, being detached by Marshal Davout from Hamburgh to protect a large convoy of powder moving there from Hanover. The movement was made in conjunction with the Governor of Magdeburg, where the convoy safely arrived on the 16th; meanwhile, on that and the previous day, a large force of the allies, under General Walmoden, crossed the Elbe at Domitz, and between Dahlemburg and the forest of Görde attacked Pecheux's force. The French fought with great determination against superior numbers, losing upwards of 1,000 men. The Congreve rockets, whose effect was entirely new to their troops, contributed greatly to their discomfiture and loss. In his bulletin about the battle, Bernadotte reports, "The English artillery and rocket corps deserve the highest encomiums." *(See* defence of Hamburgh, by General C. de Laville, as given in correspondence of Marshal Davout, by Mazade, Paris, Plon, 1885.
After the battle of Görde, the siege of Wittenberg was resumed. Exclusive of bombs, rockets were likewise used under the very able direction of the English captain, Bogue. The place was taken by assault, January 15th, 1814. *See* memoirs and campaigns of John Charles, Prince Royal of Sweden, by J. Phillippart, London, Barrington, 1814.

[2] *See* Mercer's Waterloo Campaign, pages 277–81.

[3] *See* Siborne's Waterloo letters, No. 86, page 209.

ravine, and close to a large building [La Haye Sainte], occupied by friend and foe alternately, and a position more than ordinarily murderous. The Rocket troop was 200 yards to the left of this point."

Captain F. Robertson, R.A.,[1] an old friend and comrade of one of the Rocket troop subalterns, Lieut. Adam Ward,[2] whom he calls a gallant and energetic artilleryman, was told by him in after years, that two guns being detached, under Lieut. Wright,[3] and all the other officers wounded, he was left with a sergeant and five gunners only at the end of the day with the other guns on the main position.

It is to be much regretted that among the numerous reductions which took place in the army at the end of the great war, the Rocket troop was included, and that thus, the only unit of the British Army which was present at the memorable battle of Leipsic, and which was also distinguished at the battle of Waterloo, does not now exist.

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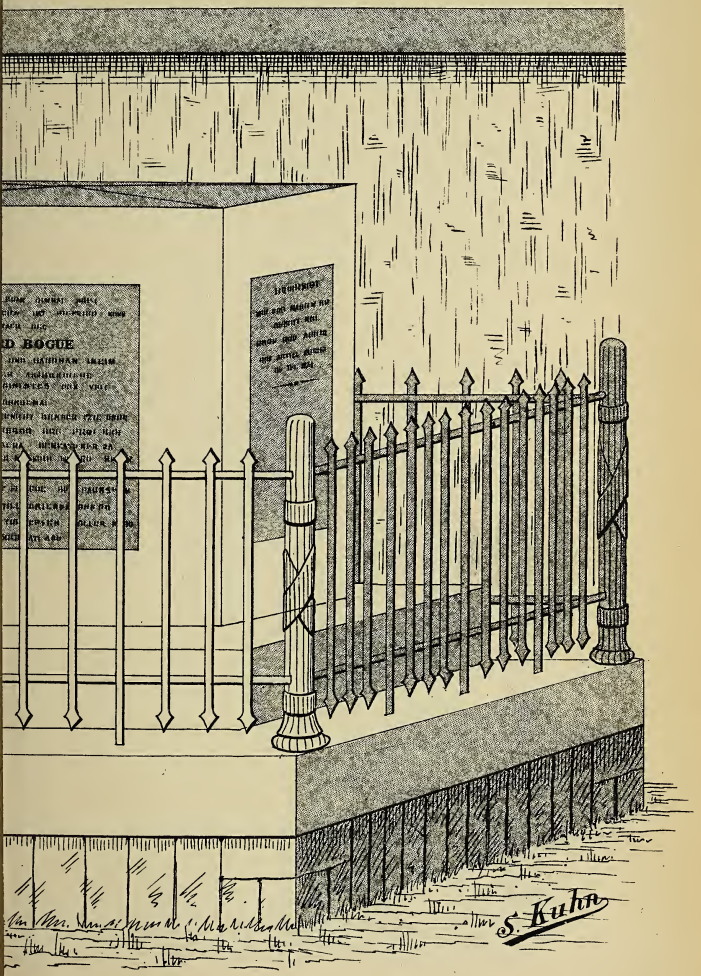
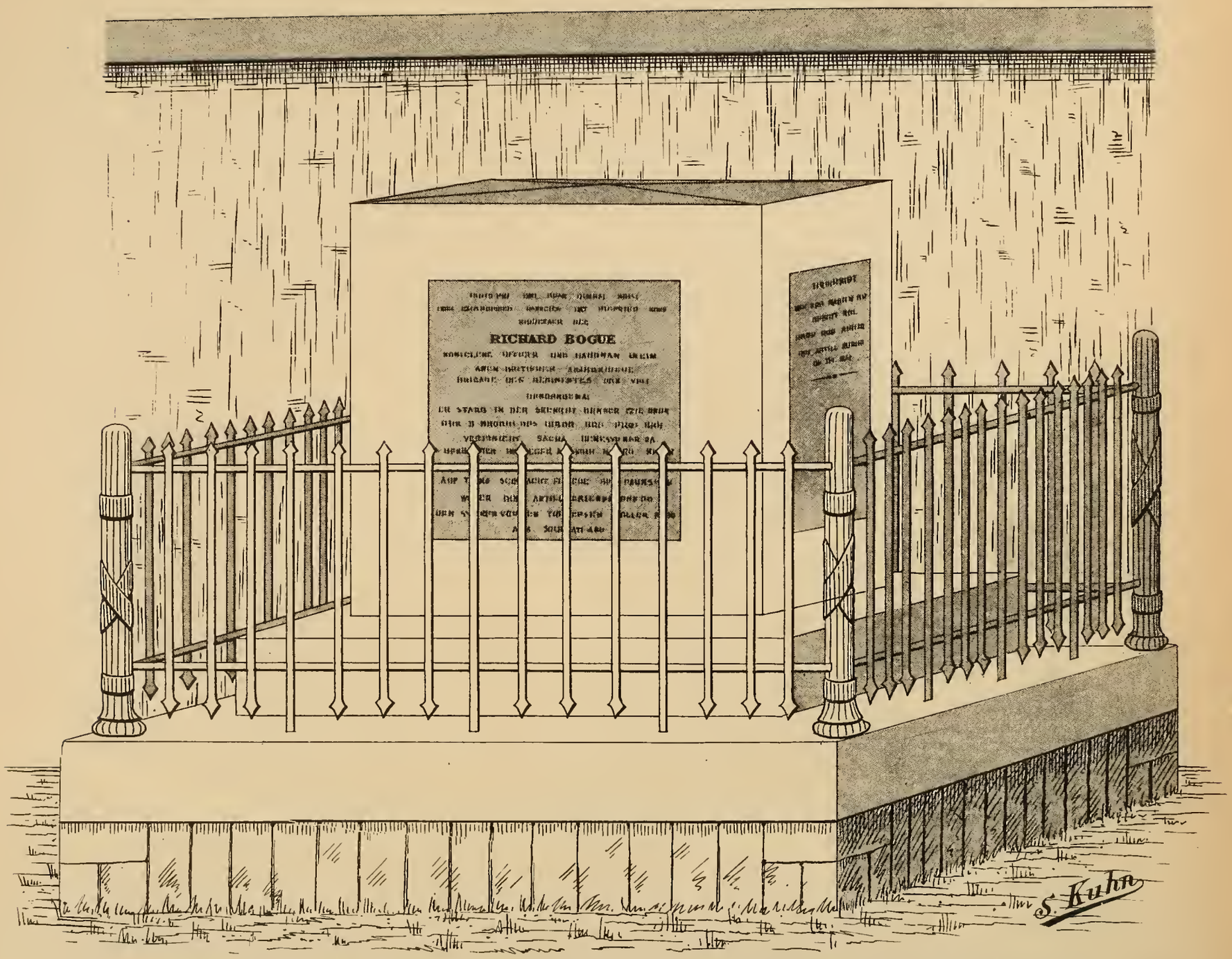
[1] Captain Frederick Robertson (Kane's List, No. 1189) was the author of a number of papers on professional subjects in the *United Service Gazette* about the year 1837. Some of these were afterwards read by Major-General Sir Richard Dacres at the R.A. Institution. One paper concerns Nelson's search for the Toulon squadron in 1805. Robertson, then a young subaltern officer, was quartered at Barbadoes, where he joined the *Victory* with a detachment of gunners. His description of the great Admiral and what occurred whilst he was on board the flagship, is most interesting.

[2] Lieutenant Adam Ward (Kane's List, No. 1428) lost a leg in the affair at Tarbes in the south of France in March 1814. He and Captain Robertson had at one time served together in the same company.

[3] Lieutenant Amherst Wright (Kane's List, No. 1359.)



UE, R.H.A. IN THE CEMETERY AT TAUCHA.



MONUMENT TO CAPTAIN R. BOGUE, R.H.A. IN THE CEMETERY AT TAUCHA.

THORN WOOLWICH

MOUNTAIN ARTILLERY DRILL, 1837.

BY

MAJOR H. C. C. D. SIMPSON, R.A.

The first experience of British artillery in mountain warfare was that acquired by the writer's late company, 4 Southern[1] (then 3 Company, Bengal Artillery) in the first Bhootan expedition, 1772. The form of transport for the light guns was, however coolie, and it was not until the first Afghan campaign, that in 1840, under Captain Backhouse, the first mule mountain battery (a native one) was organized in India. A section of this battery was destroyed at Jagdallak in the retreat through the Cabul Pass, and the remainder of the battery was broken up at the conclusion of the war in 1843. It has always been the belief of artillery officers that the Mountain Artillery branch of the Regiment is an Indian product. This is incorrect, as Backhouse, the father of the Indian Mountain Artillery, was guided in raising the native battery referred to above, by the experience he had gained from service with the mountain battery, Royal Artillery, which formed part of the artillery command under Colonel Colquhoun, in the expeditionary force under Sir de Lacy Evans, operating on the north coast of Spain in 1837, against the Carlists, in the war of the Spanish Succession.

A drill-book in *MSS.*, drawn up for the guidance of this battery by Colonel Colquhoun, has been recently discovered by the Secretary of the R.A. Institution in the archives. It is our first M.A. drill-book and its provisions, although written 60 years ago, constitute the foundation of the principles of our present M.A. drill-book; consequently a review of its contents may prove somewhat interesting to M.A. officers.

"The constitution and distribution of the battery" is dealt with as under:—

"The battery consists of four light 12-prs. (or $4\frac{2}{5}$") howitzers, and

[1] It was this company also as A/22, which in 1869, under Captain Manderson, made the experimental march from Jutogh to Mussoorie, with the first steel mountain battery equipment adopted in India. The battery was accompanied by the C.-in-C. in India, Lord Napier of Magdala, then just returned from the Abyssinia campaign.

has 36 pack mules attached, carrying 96 rounds per gun. It requires at least 48 N.-C.O.'s and men present and effective for its service, and for the care of the mules and ammunition in the field, but the number attached to the battery ought, if possible, to be 60. Nine native muleteers look after the mules, viz.: one to every four who serve with the battery on the march and in action.

The whole battery (mules included), is divided into two divisions, each in charge of a Lieutenant, and again into *front* and *reserve*.

The mules are distributed as follows:—

	MULES.
To bring the howitzers	4
„ „ „ beds (two to a load)	2
Spare mules for the guns	4
For two pair of ammunition boxes per gun carrying (per gun) 48 rounds	8
For mens' kits, tents and kettles	6
For provision and forage	2
	26

	MULES.
For 8 laboratory boxes containing special case shot carrying per gun 24 rounds ...	4
For 8 laboratory boxes containing common shell carrying per gun 24 rounds	4
For cartridges, bursters, etc., for above... ...	1
For tents, provisions and forage	1
Reserve	10
Front	26
Total mules ...	36

Six of the muleteers are attached to the "front" and three to the "reserve."[1]

The above number of cattle does not admit of any N.-C.O.'s being mounted or of any spare mules being assigned for the conveyance of the officers' baggage.

It is desirable that three N.-C.O.'s should be mounted on mules or on the strong mountain ponies of the country, viz.: one to each division and one to the reserve.[2]

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[1] The muleteers alone groomed the mules, but on parade a proportion were led by the detachment.

[2] In the present day we find these duties are more efficiently carried out by mounting the battery staff, *i.e.*, the sergeant-major, quarter-master-sergeant, farrier and collar-maker, together with the two trumpeters. At Home, the mounting of the 2nd trumpeter and collar-maker is unnecessary in my opinion.

The loads[1] are as follows (saddles not included) :—

	LBS.
The howitzers with their bearers and side arms each ...	291
Two beds, each 105 lbs., entrenching tools, etc., 48 lbs...	258
A pair of ammunition boxes	298
„ „ „ laboratory boxes containing spherical case shot 24	298
„ „ „ boxes with reserve powder, etc.	245
„ „ „ „ „ 12 common shell each	221
Three tents (dry) 159 lbs., six kettles 15 lbs. „ water buckets 6 lbs.	180
The gun saddles weigh about (each)	41
„ bed „ „ „ „	45
„ ammunition box-saddles „	35
„ „ „ „ (with leather)... ...	45

The laboratory boxes are cased on the muleteer ammunition saddles.

The mules must be distributed according to their condition and power; in general their loads will not be changed[2] except when circumstances render it necessary, but all the leading mules of a division must be tried round to ascertain what they are most fit for and to accustom them to any service they may be required to perform.

The gun beds and ammunition mules must never carry anything beyond their assigned loads, which rather exceed what animals of ordinary strength are able during the continued marches of troops to sustain.

To assist the gun mules, two spare or second gun mules are allotted to each division, and in long marches the former are always to be relieved and on no account suffered to tire. As a general rule the spare gun mules carry no burden whatever,[3] but in a case of want of transport for bread or corn (which articles are alone to be permitted to be loaded on them), 240 lbs. may be carried among them in loads not exceeding 80 lbs.; but this burden may be instantly distributed should the mules be wanted.

The mule carrying the reserve powder must be chosen out of the best of the ammunition mules, and no additional load is ever to be placed on it.[4]

A provision mule may carry two days' meat and wine and one day's bread for 50 men, and a forage mule one day's barley for the whole battery.

The battery carries seven tents, viz.: one for the officers, four for the detachments, one for the muleteers and one for the reserve, with one folding water bucket, and two infantry kettles per tent.[5]

---

[1] The weight of the loads are much about the same as at the present time, slightly in excess in some cases; the gun mule was too heavily loaded by 20 lbs.

[2] We must bear in mind this was for the climate of the northern coast of Spain and not for a tropical climate, so a relief line possibly unnecessary (*see* later on, "relief to gun mules").

[3] What a happy contrast to our present system in which the so-called relief line is but comparatively slightly less weighted than the gun line itself.

[4] The reason of this selection is not quite obvious.

[5] No mention of tent lanterns. Perhaps, as at the present day, there was no really serviceable lantern giving a good light and at the same time easily portable and not readily broken in transport and inexpensive.

The kits and blankets of the detachment are to be made up in compact bales of six in each, each mule carrying 12. The spare men attached to the reserve carry their own kits.[1] The baggage, tent, and provision, mules are assigned as follows:—

		MULES.
To each detachment ...	1 baggage mule carries each 12 mens' kits and blankets	... 4
To each division... ...	1 mule carries 3 tents, 6 kettles and 3 water buckets, the mule of the right division carries the tents and kettles of the officers, the mule of the left, those of the muleteers...	... 2
" " "	1 mule for provision and forage	... 2

The only animals whose loads admit of any increase are the tent mules in dry weather[2] and those which carry common shells, but such addition can only be admitted when the mules, as well as the rest of the battery, are in good condition.

300 lbs. is to be considered the maximum with which a mule in good condition, fit for mountain service, ought ever to be loaded, nor will he be able for this weight in ordinary marches, without extreme fatigue and loss of condition,[3] unless the load is compact, and so disposed as to favour, to the utmost, the animal's power.

When casualties occur among the cattle in the field, there being no spare mules disposable, the commanding officer, if unable immediately to procure others to replace the disabled, will appropriate first the baggage mules to take up their loads, and the men will then carry their kits.[4]

Should the battery have been in action, the mules of the reserve brought up to supply expenditure, will be for the moment available, but care is to be taken that their employment does not interfere with the maintenance of the due supply of ammunition.

It is desirable, when circumstances permit, that the battery, in addition to the resource of its baggage mules, should be provided with at least one mule per sub-division spare, making in all 40."

A description now follows of the "package" of ammunition and

[1] This principle is adhered to in all Continental Mountain Artilleries I have seen and includes the men in the fighting line also; but is not adopted by us even in temperate climates, and I think rightly so.

[2] M.B. officers would welcome the admission of a principle that allowed in their baggage loads a margin of weight for rain-sodden tents.

[3] The gun mule load exceeded this by 32 lbs. in this equipment (including the saddlery).

[4] It has been found in practice that when such casualties have occurred amongst the mules, there has been also imposed a strain on the *personnel*, and that the men consequently are less fit to carry their kits, than at the commencement of the service, which has provoked the casualties.

stores. The principle is much the same as that adopted by us at the present day, and calls for no special detail here. Importance was attached to invariably preserving equality of weight in the ammunition boxes even during the service of ammunition to the piece in action.

The only entrenching tools of a division, which were carried on the howitzer bed's saddle, were two small spades, one miner's pick, one felling axe, two bill hooks, and 25 fathoms of 2″ rope.

We then come to the duties of the detachment in action. Allowing for the difference in the equipment, the first nine numbers' duties do not differ in principle or even in detail, much from that adopted at the present time.

The detachment consisted of 12 numbers, of whom No. 10 had charge, on the march, of the baggage, provisions' and spare gun mules. In action he took charge of the 2nd ammunition mule of his sub-division.

Nos. 11 and 12, on the march, formed the advance and rear-guards and in action took charge of the baggage, provisions and spare gun mules.

No. 9 had charge of the gun mules in action, No. 7 of the first ammunition mule, and No. 6 of the howitzer bed mule.

No. 1 went down on both knees and the Nos. 2, 3, 4 and 5 on their right knees only, "in action."

The "formation of the battery in line" is dealt with as follows:— "The guns form up in line at the distance of 12 paces from each other, attended by 2, 3, 4 and 5 and the mules held by 2.

Nos. 1 on the right and left of their sub-divisions. The beds between the guns of their division, dressing by them, and attended by 6 and 9; 2, 3, and 6 in line with the mules' heads, 4, 5, and 9 in line with the rear of the saddles.

The first pair of ammunition boxes are in rear of their respective guns, at the distance of 12 paces, the mules are held by a muleteer in the right hand, No. 7 is on the right in line with the mules' heads.

The second pair of ammunition boxes cover the first at a distance of one length held by 8 in the left hand.

In rear of the centre of the battery, and at 24 paces from the rear line of ammunition boxes, the provisions, tents, baggage and spare mules are formed in close order; the provision mules in the centre, held by 11 of guns two and three; the tent mules next outwards, held by 11 of guns one and four; the baggage mules by 10 (all holding the heads of their mules by the left hand[1]) and, lastly, the spare gun mules, each pair in charge of a muleteer. The officers dismount six paces in front of their divisions.

If the reserve[2] is not up, Nos. 1 and 2 form in single rank, six paces in rear of the centre of the last line of mules. If the reserve is present, the whole form in line 12 paces in rear of the spare and

[1] The advantage of this is not quite obvious.

[2] The "front" and "reserve" corresponded to our "gun line" and "ammunition line," with this exception, that in the former case, the "front" line might be separated from the "reserve" line for a day or two without inconvenience; whereas our division of the battery is merely a temporary one for "action" and "manœuvre."

baggage mules, the reserve powder and baggage mules being placed in the centre, covering the provisions and mules with the laboratory boxes on their right and left.

The spare gunners attached to the reserve are to be distributed, so that each mule, or at least every two, may have a holder.

The N.-C.O. in charge of the reserve with No. 12, and the rest of the spare gunners will be formed in single rank, six paces in rear of the whole."

Then follows the detail for "column of route" on the line of march, practically the same as in the present Indian and Continental drills, *i.e.*, mules in single file, not in pairs, as in the Home Drill Book.

Similar also are the general principles to be followed on the march.

The "movements" that were considered necessary for a mountain battery were "formation in line" to a flank or to the rear, the "advance of a flank in échelon," doubling the front of the column of route[1] to diminish its extent, and the counter-march. All these were executed in the same manner and by the same words of command as in a field battery, the N.-C.O.'s repeating the executive commands.

"Coming into action" and "limbering up," called "preparing for action" and "preparing to advance" respectively, were executed on the principle of present methods, but a quantity of lashing employed in lieu of our straps.

The encampment of the battery was formed at half or close interval; the gunners' tents on the flank at 12 paces distant, in line with guns and ammunition boxes, which latter, in bad weather only, were brought under cover of the tents; the mules and the officers' horses were picketted in two lines near the battery and under charge of at least two sentries.

When the battery halted in a village the guns were placed in a church.[1]

Lastly, "range and effect of fire" are dealt with. The mountain howitzer we learn, without the quoin, stood at 32° nearly, and at this elevation two ounces of powder gave a range of about 515 yards and required $1\frac{7}{10}$" fuze. The usual charge was eight ounces, for which 1° of elevation was given for every 100 yards. It goes on to say,: "In general, elevated positions are to be avoided, the fire of the howitzer being most accurate when the object is not much below its level, so that the howitzer when laid has its axis above the horizon. When fired at a depression, the mountain howitzer usually leaps quite out of its bed, and where the ground slopes in the direction of the recoil, the gun and bed comes back with violence to a considerable distance. The latter inconvenience may often be remedied by a proper choice of ground on which to place the bed. Occasionally when the ground, occupied by the enemy, is hollow or entrenched, long fuzes, which will admit the shells to strike above and behind the parapet or cover, and to roll down, may be used with effect and when an enemy is posted near to, and in front of buildings, the shells may be directed on the walls above, so as to rebound and fall within its works, etc."

[1] Column of sections.

[2] No such luxury for them nowadays.

A little range table for use when firing spherical case shot, concludes the treatise than which, a much better one, bearing in mind the equipment of those days and the nature of the service, it would be difficult to draw up with all our experience, even in these days.

The detachment which formed the battery consisted of 60 N.-C.O.'s and men, under Lieutenants Warburton and Collingwood Dickson (now Sir Collingwood Dickson, V.C., G.C.B.) and left Woolwich in January 1837 for Biscay. On the organization of the battery on their arrival, Captain Bassett, who had arrived in Spain in the previous November, assumed the command and some 12-pr. rockets[1] were supplied to the battery. The conduct of the battery received most favourable mention, both from Sir de Lacy Evans and Lord John Hay, who commanded the squadron off the coast, and on the strength of which, the land forces, by some strange arrangement, were borne. The Mountain Artillery arrangements did not absolve the battery from service when required in the garrison batteries. With the small Field Artillery unit, it was detailed for duty on emergency in the various forts which formed the line of defence in front of San Sebastian in conjunction with the Spanish Artillery of the Legion. During the year 1838 several minor operations were undertaken from San Sebastian against the Carlists from time to time, in which the battery took part, but they were of no great importance and were directed principally against the small Carlist towns on the coast in the vicinity of San Sebastian, in order to harass the enemy and intercept supplies coming into these small ports from France. These operations were naval expeditions in which the steamers of Lord John Hay's squadron conveyed troops, and (owing to the mountainous nature of the country) Mountain Artillery, which landed and occupied these places for a short time, capturing and destroying any stores which the enemy had been unable to take away, was employed.

By the convention of Bergara in 1839, the war in the Basque provinces was put an end to, and in the summer of 1840 the battery was broken up, and the detachment which formed it, returned to Woolwich with the other artillery detachments. Captain Bassett and Lieutenant Warburton received the Spanish Order of the 1st class of San Fernando for their services.

In conclusion let us briefly consider our present Home M.A. Establishment and the mountain gun of the future.

In the very likely event of our one battery[2] at Newport being required for active service in India, or with an expeditionary force from

[1] A description of the mode of carrying rocket equipment in pack in Spain is described in my article published some years ago in "Proceedings," R.A.I., on "Equipment and Services of M.A from Pyrenean campaign 1813, to Abyssinian expedition, 1868."

[2] The strength of this battery (including 20 boys) is greater then that of one of the double Garrison Companies with 7 officers, about to be formed. To it should be attached a District Officer to assist O.C. Battery in such depôt duties, as in the other branches would be carried out by a Lt.-Colonel and his staff, and to assume charge of the depôt increment, on the despatch of battery on active service or to practice camp, &c.

To admit of battery instruction in replacement of ammunition and casualties in action, and the parade in marching order of a section complete, the number of mules should be increased by 4 over present establishment. To meet this increase, without extra expense, the number of horses might be reduced by 2, (*see* previous foot note), and the extra allowance of straw to the mules be discontinued, whilst the mules are in barrack stables, being only issued in peace whilst in camp. Remounts in future to be at least 1″ higher than at present.

home acting elsewhere, an expansion of the depôt nucleus attached to it, and then left behind, would be necessary to act both as a depôt and as a first reserve for the whole Mountain Artillery force then abroad.

It also appears desirable that the garrison company stationed in Egypt and to which a mountain equipment is attached should, on completion of its foreign tour, be invariably relieved by a company from home which has previously acquired some slight knowledge of the drill with mountain guns and its new duties with the same.

To provide modestly for the above requirements without extra expense to the State, it appears desirable to select a company stationed in the south of England and to issue, as part of the movable armament of the sub-district to which it is attached, two mountain guns with two pair of ammunition boxes and one set of cradles (without saddlery). Then to train in the winter months (so as not to interfere with the spring and summer Garrison Artillery drills) a class of selected N.-C.O.'s and men in the service of the guns and the theory of Mountain Artillery work. A few rounds of shrapnel for these guns should be allowed as part of the annual elementary practice of the company.

The guns would be, moreover, most useful as movable armament on account of their easy transport to any point on the coast threatened by landing of hostile boat parties. A small reserve would thus be formed for the above purposes.

Our present screw gun, although a satisfactory man-slayer, has both in Chitral and Matabeleland shown itself of very little use against obstacles such as "sungas" and "koppies." The double shell of the 7-pr. gun of 200lbs. was, however, effective on many occasions at short ranges against the former, in the last Afghan war. Our mountain gun of the future should therefore be one of 425 lbs. jointed, throwing a 12-lbs. shell with the initial velocity of our present screw gun; each ammunition box to carry seven rounds of shell and cordite cartridges, the cradles to be of aluminium and steel and pads stuffed with cork shavings.

Some writers are urging the introduction into our Mountain Artillery of the 4-in. R.M.L. jointed howitzer. I cannot agree with them. In my opinion this piece, requiring a large number of pack animals for the transport of its equipment and ammunition, should be regarded as constituting a part of a special light colonial siege equipment, for employment as a special service, in our small Colonial or Indian Expeditions, where some fortified position, such as may be met with in irregular warfare, has to be breached. Its organization and equipment bears the same relation to the Mountain Artillery, that in India the heavy batteries do to the Field Artillery proper, and it should be manned and formed by the siege branch of the Regiment.

I, however, quite agree that our minimum home and colonial establishments of Mountain Artillery should be four batteries; that is, sufficient for "one division for all arms," and a depôt, stationed 2 at Home, 1 in Egypt and 1 in Natal. The uniform and equipment of *personnel* to be exactly similar to the batteries in India, which it is not at present.

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THE BRITISH ARMY ON THE CONTINENT OF EUROPE.[1]

BY

THOMAS MILLER MAGUIRE, ESQ., LL.D.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 26th Nov., 1896*).

MAJOR-GENERAL J. F. MAURICE, C.B., IN THE CHAIR.

CHAIRMAN—Gentlemen, you all know Dr. Maguire so well that I am sure I need not introduce him and, therefore, I will at once ask him to favor us with his lecture.

DR. THOMAS MILLER MAGUIRE—Gentlemen, I need scarcely say that I feel it a very great honor indeed to be allowed, in the presence of the Royal Artillery, to direct your attention for a short time to the exploits of the British army on the continent of Europe.

The British nation has had vividly brought to its notice recently by a great many articles in all the public journals the absolute necessity of maintaining its navy in a state of efficiency. A lecture which would embrace the operations of the two branches of the service, including the men who serve on board ship as well as the men who serve in the field, would occupy us a very considerable portion of the remainder of the year, and the operations of the British army in all the distant possessions of the British Crown in India and America, would take us almost to the end of next year. But we have not had our attention much directed in recent days to the long continued action of the British soldier as maintaining the balance of power as well as celebrating the fame of his nation on the continent of Europe itself. Yet from the middle ages till 1856, the most distinguished and trusted soldier in Europe was the British soldier. The infantry of Edward III. and the infantry of Henry V., the archers at Crecy and Poictiers, the

[1] This lecture was *extempore* and illustrated by wall maps. In the Appendix will be found several data that could not be included in the text. The sketch maps contain all the places mentioned in the lecture.

men-at-arms and archers at Agincourt, fought with great renown against the brave and chivalrous French for a period of 100 years. Further, some of the most celebrated chiefs in Italy were very glad indeed in the fourteenth and fifteenth centuries to avail themselves of the bravery of soldiers from Great Britain—as is proved by the careers of Hawkwood (Aguto) and other leaders of free companies.

The period which I particularly propose to dwell upon is from the accession of Queen Elizabeth till the close of the Crimean war. The British army has not done much in Europe since the close of the Crimean war. The theory of "the balance of power" has been comparatively ignored by British politicians since the close of that war, but I do not intend to-night to enter into a political discussion. Perhaps the gallant officer who is in the chair might have something to say upon that point. I have read his work on the modern balance of power with much interest; but, gentlemen, we are not here to consider whether the balance of power is good politically or not, or to deal with the British soldier under the influence of this or that political theory, or with the object of securing this or that particular aim. I am not at all certain that it would not have been a very good thing for Europe as well as for England if the English had not forgotten altogether their old theory of the balance of power—reference to Denmark, for instance, in 1864. Be this as it may, since the Crimean war the British soldier has not played a prominent part on any part of the continent of Europe. But from the glorious days of Queen Elizabeth till the close of the Crimean war, in regard to every serious problem which agitated the European mind, he was deeply concerned. I select the reign of Queen Elizabeth for several reasons: one, that by that time the effects of the discovery of America and the discovery of the passage to India by the Cape of Good Hope, began to be widely felt in the domains of commerce and politics, all kinds of adventurers came to the front, our old "sea dogs" Drake, Hawkins, Frobisher and others amongst the rest. In her reign also other causes were at work. Feudalism and its military methods were dead; the art of printing and the Renaissance diffused intellectual curiosity; religious disputes divided nations into hostile camps; large ships began to keep the sea; constant warfare in the Netherlands or in Germany or in France or against Solyman the Magnificent afforded a fertile field for adventurers of all kinds, and prominent amongst these adventurers, whether in Flanders or in Brabant, in France or in Spain or in the stormy Atlantic or amidst the everlasting ice which hemmed in the north-west and north-east passages, were Britons.

Queen Elizabeth's own policy was an enigma. The champion diplomatic liar of all the Spanish empire admitted her superiority in the art of duplicity. Her troops would very gladly indeed have thrown themselves heartily into the religious contests and constant revolts that agitated France and the Netherlands, but she thwarted their most ambitious projects by her vacillating policy, but though she might starve them, she could not extinguish their energy. British soldiers were publicly commended by such an enemy of their name and nation

as the Duke of Parma. British officers defended Bergen-op-Zoom and Helvoetsluys. Lord Willoughby and other Englishmen conduced in no small degree to the triumph of Henry of Navarre over the League. Among the many touching and terrible episodes of the revolt of the Netherlands, one of the best known is the death of Sir Philip Sidney at Zutphen. I have deliberately excluded from my subject affairs at sea, but soldiers were as prominent as sailors in the defeat of the Spanish Armada. Our soldiers, as you see here on the map, "singed the King of Spain's beard" most effectively. There were British invasions of Spain at Corunna, or the Groyne, at Vigo, and at other places. A British army marched in "the journey of Portugal" on the same route as was followed in the beginning of the nineteenth century; our army landed near Piniche under Norris and Essex and moved down the mountains where long afterwards were constructed the lines of Torres Vedras. The British soldiers made a most remarkable attack on Cadiz in 1596—a splendid feat of arms that spread our glory over Europe and was a bitter humiliation to our enemy.

Now, gentlemen, when you remember the small population of England at this period, and when you remember that England was at this period at war with such powerful Irish sept leaders as O'Neal and O'Donnell, and that Scotland was far from friendly, you must admit that the English people displayed no small energy, martial as well as naval, at the close of the sixteenth century (cheers).

At the beginning of the seventeenth century an appalling disaster broke over central Europe. It is hard to estimate the injury done to Germany by the Thirty Years' War. Most of you gentlemen have read Schiller, but every author admits that Germany, from being one of the most flourishing nations, became one of the poorest owing to the horrors of this period. Parts of the Fatherland have never recovered from the devastating license of the champions of two Christian creeds, whose barbarities rivalled the horrors of the "great horde" or the worst violence of Islam. The savage soldiery lived by plunder wherever they went, and the arrival of a Swedish army, under Gustavus Adolphus, though good for protestantism, was not of much benefit to Germany at large. Who were some of the very best troops fighting on the continent of Europe in this Thirty Years' War?—Scotch and British soldiers. The military tutor of Cromwell learned the art of war in Germany. Leslie, who commanded at Dunbar against Cromwell, learned the art of war in Germany. As to the army of Gustavus Adolphus, some of the most eminent soldiers of that Swedish Prince were Scotchmen. At the battle of Lützen, where Gustavus Adolphus was killed, the reserve was commanded by Henderson a Scotchman. In the Swedish army, then the best in Europe, there were no fewer than six British Generals, 30 British Colonels and 51 British Lieut.-Colonels. So famous was the soldiery of Britain, that they were eagerly welcomed in any army under the banner of which they volunteered to serve. Our King James I. is not illustrious for his military policy, but his troops, in spite of the manner in which they were checkmated by their government, maintained the fame of the soldiers of Crecy and Agin-

court, fighting on the Oder, the Saale, the Elbe and the Danube. A very well known incident and a very satisfactory incident in the opinion of the House of Austria, was the murder of Wallenstein, the most singular and ablest soldier of the period—next to Gustavus Adolphus. There was not to be found in all the empire any man brave enough to beard him and to murder him except an Irishman or a Scotchman, and accordingly Wallenstein met his death at the hands of five Britons, Fitzgerald, Butler, Devereux, Leslie and Gordon. Three Irish and two Scotch soldiers of fortune killed Wallenstein and they were liberally rewarded by the Emperor of Germany, not a German being found to volunteer for the task. However, we need not be too proud of this particular incident.

Now, gentlemen, I come to the time of Cromwell, I do not know what the feelings of gentlemen present are about his politics, but however we may look at them, merely from the interior point of view, we must admit, I think, that he was a true blue Englishman, having regard to the interests of his country abroad. The puritans of his time had not the slightest sympathy with the interest of any foreign country. Cromwell made a league with France against Spain. The very bravest infantry in the world, which was supposed to be invincible, was the Spanish infantry. It is specially commended by Lord Bacon in one of his essays; but that Spanish infantry was not invincible against the soldiers we had triumphed both at Dunbar and at Drogheda. Lockhart's brigade of Cromwell's soldiery beat the Spanish at the battle of the Dunes near Dunkirk. In the time of Charles II. abroad Britons, sometimes under Turenne against the Dutch, at other times for them—in 1672 against them, in 1678 for them—and upon each occasion the fame of the British soldiery was enhanced. Soldiers manned our ships during the great sea fights.

We come to the reign of William III., and from the time of William III. till the days of Queen Victoria it is easy to prove that the policy of the British nation influenced the policy of all Europe from the Neime to the Channel and from Cadiz to Copenhagen. I am about to try to show how the nation secured the balance of power from 1689 to the outbreak of the French Revolution, which cast to the wind the whole policy of the past ages, only to establish a reign of license under the name of liberty, which was followed by a tremendous military despotism.

In the year 1689 was passed the Mutiny Act, and that Mutiny Act allowed a standing army (I direct your attention to that phrase in the Mutiny Act) to be tolerated as against the old prejudice that existed against such a force. Before the Mutiny Act the British Parliament preferred the old militia and abhorred a standing army. *En passant*, I may say, that in the late autumn manœuvres the militia seemed to be recovering its ancient prestige. But however that may be, in the year 1689 the new clause was that the standing army was to be supported for the defence of the possessions of Her Majesty's Crown for the safety of the kingdom and for *the preservation of the balance of power in Europe*.

William III. immediately proceeded to use the army which he had got for the preservation of the balance of power against Louis XIV., and when you consider that the income of England at that period was some eleven millions, and when you consider the small population, which was some six millions, and the fact that Ireland was in open rebellion, and that Scotland might be largely discounted, I think, gentlemen, you will agree that the action of England in the Nine Years' War, from 1688 to 1697, was very highly distinguished. It preserved its own shores invulnerable, and yet found resources to enable it to play a leading part in the wars in Belgium. I need only mention the battles of Steenkirk and Landen and the siege of Namur, the result being that Louis XIV.'s policy was defeated and that the balance of power was maintained. If the British fought well under William III. they did better still under the great Marlborough. I believe some of you gentlemen were present last year at the discussion when the Commander-in-Chief set forth his views with regard to the admirable tactics and strategy of Marlborough, and I quite admit all that can be said in praise of Marlborough. But I want to direct your attention to the British soldier and the martial energy of the British race as well as to the great ability of this particular General.

Having regard to the means of communication and, having regard to the fact that the sea had to be crossed, it is a very remarkable thing indeed to find British troops moving through Holland, up the Rhine, across the Neckar and on to the Danube, between Ulm and Ingoldstadt in 1704. If the British soldiers could do that, thus preserving the balance of power with their comparatively small resources as compared with the resources of continental States, I have never been able to make out why they could not hold their own at present, having regard to the existing resources of the British Empire[1] as compared with those of foreign States. But not only did the British fight all these battles: the battle of Blenheim, the battle of Ramillies, Ordenarde and Malplaquet, and take part in the great sieges in Belgium, but in Spain also they maintained armies and they entered Madrid twice.

Macaulay eloquently describes the action of Peterborough at Barcelona and the capture of Gibraltar. The British have since clung to the rock; which guards the entrance to the Mediterranean in spite of all attempts to retake it. I have here a quotation from a Spanish paper published in this month's journal of the United Service Institute upon this very point, the enormous value of Gibraltar to Britain. The other principal Generals in Spain were Galway and Stanhope.

The battle of Almanza in which, through the fault of our allies, the British were defeated, is a curious example of the state of things that then prevailed. Some of the best soldiers of each power were exiles from the hostile power. The leader of the British army at Almanza in 1707 was a French protestant called De Ruvigny (Lord Galway); the leader of the French army was Berwick, an illegitimate son of James

[1] *See* Appendix.

II., an English catholic in the service of France. And this leads me to another very remarkable fact in connection with my subject. The chosen guardians of the French Kings were not Frenchmen, they were Swiss to some extent, but the most select guardians were Scotchmen. From 1476 till the French Revolution the chosen body-guard of the French Kings were gentlemen of Scotch descent and Scotch name. Moreover, after the restoration of the Bourbons, Scotchmen were selected to carry the remains of Louis XVI. and Marie Antoinette to their last resting-place in the chapel of St. Denis. Far more remarkable was the Irish brigade in the service of France. It was the only brigade in that service that in the last century inflicted in the open field a decisive defeat on British infantry. As to the British soldiers in Europe—I do not care whether they were catholic, protestant, English, Scotch or Irish—whatever service the British soldier entered, he soon came to the fore as a good fighting man.

The most illustrious soldier of Frederick the Great was a Scotch gentleman, Marshal Keith, who, after the Stuart failure, joined the Swedish army, then entered the Russian service and became a Marshal, and ultimately joined the Prussian service and met his death in battle in 1758.

To come to the war of the Austrian Succession, again we find the British principle of the balance of power in Europe was set up as against Frederick, not then Frederick the Great, but afterwards Frederick the Great. In that war there were several battles, some of which I saw represented on the pictures in the hall. The English did not experience very good fortune in the field on the continent of Europe during that war, but they were at the battle of Dettingen on the Maine in 1743. I will not trouble you by telling you how George II. broke through the opposing Frenchmen, leading himself his infantry, but that was an exceedingly gallant exploit and brought the prestige of the British infantry again up to a high standard of fame. But the most remarkable battle was that of Fontenoy, and I have just got here something that reminded me of the politeness of Britons at this period. "At the battle of Fontenoy the English advanced along the line composed of French and Swiss guards, having on the right two other French regiments advancing to meet them. The regiment of British guards was at a distance of 50 paces and the Royal Scotch were forward. Mr. Campbell was the Lieut.-General and the English officers saluted the French by taking off their hats. Two French officers, including a Duke, advanced forward and returned the compliment. Then the Captain of the English guards said 'fire,' but the commander of the French guards answered in a loud voice, 'we never fire first, fire you first,' and then the Captain of the English guards very wisely said to his men, 'fire.'" Nineteen officers of the French guards and 11 of the Swiss were wounded by this discharge. When the Dutch on the right and the Austrians on the left gave way, not from any feeling of courtesy, but for more personal reasons, a fine British column was formed by the Duke of Cumberland which marched straight on to the position of the French and turned back regiment

after regiment and charge after charge till it was attacked by the six regiments of Clare, the old Irish brigade, and had to give way?" I have here an Irish song about the matter, but really think I had better not quote it. I fear it would not meet with your approval[1] The British column and the Irish brigade won immortal fame at the battle of Fontenoy.

A well known Huguenot officer was Ligonier who ultimately, strange to say, became Commander-in-Chief of the British army. He made a remarkable charge at Lauffeld, 1747. His favorite regiment was the Black Horse, the 7th Dragoons. A proposal was made to George III. to disband that regiment and he immediately, in his usual abrupt style, said: "What! what! abolish the 7th Black Horse that saved my grandfather's life at Dettingen, I will never do anything of the kind."

At the close of that war of the Austrian Succession, all conquests on every side were given up, except Silesia, and therefore one of the leading objects for which a standing army was started in England, to wit, the maintenance of the balance of power, was, in spite of a rebellion in England and the invasion of England which was prepared at that time—I say in spite of our bad fortune except at sea—the balance of power was, on the whole, preserved.

The next war was the Seven Years' War from 1756 to 1763. The English, who were fighting for Austria in the previous war, finding that, owing to the coalition of Russia and Austria, and France against Prussia, the balance of power might be seriously disturbed, now joined Prussia. We hear a good deal of Prussia, much more, I think, than most of us wish to hear. I wish the Prussians would just read up a little more about our assistance, about how we helped to make and preserve their nation. If they did, I think they would talk a little more civilly. In the crisis of its fate Prussia owed its existence to the British race. During the whole of the Seven Years' War where would Prussia have been but for British subsidies and British men and during 1813 and 1814 it would be well for Prussia to remember how England, having saved herself by her courage, saved Europe, including Prussia by her example and, much more than her example, by distributing some twelve millions of money. I do not say this in disparagement of either Prussia or France or any other European power. It does not follow because we are here to speak well of Great Britain that we should speak badly of anybody else. But in regard to the recent celebration of the battle of Trafalgar Bay, preposterous suggestions were made that the British should be the only race to ignore its past victories and to minimize the exploits of its ancestors. I heard a Frenchman say that if Villeneuve, at the battle of Trafalgar, had only taken the English ships instead of the British taking French ships, they would have been decorating his statue every Sunday from that day to this.

One of the most celebrated actions of the British infantry was at Minden in 1759. I cannot say the British cavalry were effective in

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[1] *See* Appendix.

that engagement, but one of our cavalry officers who was conspicuous in that action was the Marquis of Granby, though Lord George Sackville did not charge. However, the six regiments of infantry that were engaged upon that occasion, won the heartiest thanks of Prince Ferdinand of Brunswick for the manner in which they stood their ground. And again at Kirchdenkern in 1761 the allies, among whom the British were prominent, defeated the French. The British surpassed themselves during this war—founded for themselves, after Plassey 1757, an empire in India, now one of the greatest empires in the world from every point of view, and founded another empire in Canada and maintained a vast navy and swept hostile fleets from every sea; and, at the same time, had energy enough to send soldiers to fight in Hanover and Saxony, and to fight well and to win praise from the most able masters of continental warfare. Verily, at that period, British mothers used to give birth to men, I hope they will continue the process.

In the next great war England was very hard pressed, it ended in the loss of the American colonies, and yet the British clung to their own with extraordinary tenacity, while they certainly were only beaten by its own people—not beaten in the field—the soldiers were not beaten, but it is hard to conquer a continent—at any rate it did not keep the United States. But while losing the United States they strengthened their position in India and maintained, at the end of the war at any rate, command of the sea under Rodney and kept the standard of St. George floating over the Rock of Gibraltar under Elliott for four years in spite of the most tremendous efforts of France and Spain.

The most tremendous struggle that was ever entered into by our nation was, of course, the French Revolutionary War and the consequent war against Napoleon. The population of Britain all told, I suppose about 1793, could not, with Ireland and Scotland, have been more than seventeen millions. The population of France during part of this war was forty millions, not to speak of the people in the north of Italy and the possessions on the further side of the Rhine and of the south German States under the sway of Napoleon, and yet the British nation not only became absolutely supreme at sea, but was constantly sending out some expedition. These expeditions were, as you know, to all parts of the earth, but my subject confines me to Europe. There were three expeditions to Holland. I quite admit some of them were not brilliant successes. In spite of the heroism of the guards and of the commander (Colonel Arthur Wellesley) of the 33rd regiment and the bravery of certain Highland regiments, undoubtedly the Duke of York and his successors were driven back step by step from the Scheldt to Bremen in Germany. Thus the expedition of 1793 was a failure; and in 1799 there was another expedition, the Helder expedition, which was also a failure, though some good fighting took place at Alkmaar. But these expeditions and the affairs of Burgoyne at Saratoga, and Cornwallis at York Town and the few failures at the beginning of the Seven Years' War at St. Malo and Cherbourg are

the principal failures of the British in all these three hundred years. These seem to be a source of infinite satisfaction to a certain class of military writers and the Walcheren expedition in 1809 completes the sum of their happiness. These little Englanders trot out anything that may tend to disparage their race and they forget the glories indicated in this lecture.

Gentlemen, a distinguished statesman recently said that it was absurd to say that the Peninsular war produced any particular effect on the fortunes of Napoleon. Now that was a most extraordinary statement by this marvellous statesman. Napoleon himself ought to be some judge of his own fortunes, and at St. Helena Napoleon said that it was the Spanish ulcer which destroyed him. But who kept the Spanish ulcer troublesome, who exasperated it, who tickled it up and who irritated it?—The British army. The Spanish regular army was most insufficient. The Spanish guerillas did very nearly as much harm to their country then as they did to the French, at anyrate in some parts of the theatre of operations and their proceedings gave an atrocious tone to the conflict. But the British never stopped till it had defeated every French army in succession. But surely a detaining force, even a rhetorician might know, can play as important a part in a war as the main force. I think General Hamley says "the skilful use of a detaining force is the principal weapon in the military armoury."

When Napoleon had been driven back from the Beresina to the Oder and the Elbe he was very short of men indeed in 1813. I have some figures to prove that that was so. But the British kept shut up in the Peninsula in the year 1813, 191,000 men, and if these men had been on the Elbe during the campaign of Dresden, would the Russians, Austrians and Prussians have been able to cross the Rhine in the beginning of 1814?—They would not. But more than that, Wellington, in the south of France, detained 90,000 men under Soult and Suchet in 1814. If Napoleon was able to carry on the campaign from February till March with 100,000 men, what would he have been able to do with 190,000 men, and he would have had those but for Wellington's army? Therefore, if the British did nothing but to act as a skilful, detaining force in the Peninsula, they conduced very much indeed to the fall of Napoleon and to the liberation of Europe from his tyranny.

I am sure it must be very trying to you to listen so patiently to my long lecture, and as time is getting short and there are plenty of officers here, I will leave them to dwell upon the exploits of the artillery.

I am dealing with the military forces of the Crown and the energy of the nation from which they sprang, and the decision of the politicians who, with all their faults, directed them so well for so many years. I say I could pick out from those battle-fields (marked in red on those maps on the wall) examples of every form of military excellence and go on for hours describing them, shewing the strategic skill and the tactical ability that have always been so often displayed. I say the strategy of Marlborough was just as good as that of any Prussian who ever lived. I say the tactics of the British in the Peninsula were at

least as good as those of the French in the Peninsula, at anyrate we won. There is a splendid song about this:—

Dost thou remember, soldier old and hoary,
The days we fought and conquered side by side
On fields of battle, famous now in story,
Where Briton triumphed and where Britons died?
Dost thou remember all our old campaigning
O'er many a field of Portugal and Spain?
Of our old comrades few are now remaining
How many sleep upon the grassy plain?

Rememberest thou the bloody Albuera
The deadly breach in Badajos' walls,
Vittoria, Salamanca, Talavera,
Till Roncesvalles echoed to our balls.
Ha! how we drove the Frenchmen all before us
As foam is driven before the stormy breeze.
We fought right on with conquering banners o'er us
From Torres Vedras to the Pyrenees.

[1] There is a great deal more of it and such songs should be frequently sung at our festive commemorations, but my time is passing.

After the lull which followed the peace of Amiens, 1802, we soon resumed our warlike enterprises. From 1803–1805 we were in danger of an invasion and Napoleon saw that he must soon cope with a coalition. Some of our modern anti-British theorists lay it down that Britain, since Agincourt, never fought on the continent alone, only as a member of a coalition. But surely the same remark applies to Prussia till 1866, to Austria throughout, to old France as often as it could get an ally and to Napoleon himself. If allies fought for us, we also fought for allies and we did much more for our allies than they ever did for us; and we often paid the piper when they were bankrupt in financial as well as military credit. "Our armies were part of composite forces," they say; "we made a fiddle-faddle about a Hessian horse and saddle"—but what about the old Prussian army? what about the old French army? how many Italians and Poles fought for Napoleon in the Peninsula? how many myriads of others than Frenchmen marched against the Muscovites and to their own doom under the eagles of the Emperor? These gentlemen would have us believe that our rulers and generals have for ages been the laughing stock of Europe, whereas, in point of fact from a military point of view, we have for three centuries done very much better than any other European race. When these gentlemen are tired of traducing their own people they forthwith burst into fine rhapsodies about some foreign leader—from our poor folk they turn to Napoleon. I yield no one in admiration for Napoleon, but his blunders and military errors transcended all ours put together What about his failure in Egypt, in Syria? the retreat from Acre? the capitulation of Alexandria? the whole of the Peninsular war was a political and strategic error of the

[1] *See* Appendix (Vial quoted).

first order; the invasion of Russia was a horrible and appalling mistake, more costly in men than all our mistakes since the battle of Castillon. "Show me a general," said the immortal Corsican, "who never made a mistake and I will say he never made war." I confess I am weary to death of adulation and imitation of foreigners and disparagement of ourselves.

In 1805 the danger of invasion was over; and, secure behind the inviolate sea, Britons were not only able to strike hard on every ocean against Napoleon's prohibitive commercial continental policy, but to send out expeditions to every part of the world: India, the Dutch possessions, Mauritius, Egypt, Buenos Ayres, the United States. Some of these were failures, but the expedition from Sicily to Calabria proved at Maida, 1806, that British officers and men could cope with French veterans. Our expedition to Copenhagen, 1807, was also a success, and in 1808 we began in the Peninsula a career of success which ultimately brought our troops, first of all the allies, across the French frontier to the ruin of our mighty antagonist.

I maintain that the strategy and tactics of Wellington in the campaign of 1815 were just as good as the strategy and tactics of Napoleon, Grouchy, D'Erlon or Blucher in the same campaign. Some say that after all the British did not win the battle of Waterloo; that they had not 30,000 men there. Well, gentlemen, enough is as good as a feast; the injury they did Napoleon sufficed; he did not want any more Britons there; somehow or another, after all his efforts from 1793 till 1815, the only part of the British empire that he ever invaded was St. Helena and that was against his will. Others say that the Prussians won the battle of Waterloo, though they admit that the Prussians did not win either Ligny or Quatre Bras. Well, they certainly had not won the battle at 5 o'clock, for it was not till that hour that they came into the arena to any very considerable extent. I know that about 1 o'clock they had to be watched. The truth is, gentlemen, that your ancestors, the invincible British infantry and gunners and cavalry, repulsed the chosen troops of the Emperor, foiled him and that the Prussians completed his ruin. Chesney proves all this beyond doubt. What does General Foy say? Surely there could be no more competent or less prejudiced authority—he says in words that should be inscribed in golden letters on the walls of every British school from the Boards school of the Stratford le Bow of London to Eton and Harrow. I read it in English as my French, is after the "school" of the former place: "The cavalry had been cut to pieces; the fire of the artillery was extinguished; general officers and staff galloped from one square to the other, uncertain of obtaining shelter; carriages, wounded men, reserve parks, auxiliary troops, fled in confusion to Brussels; death was before them and in their ranks. In this terrible condition the bullets of the Imperial Guard and the cavalry of victorious France failed to shake the immovable British infantry. One would have supposed that they had taken root in the earth if the battalions had not, as the sun set, spread themselves out, and given to Wellington as his reward, for maintaining such an attitude, the most decisive

victory of the age." Thus the ancestors of the paltry little Englander in 1815 on the plains of Belgium. He should buy the *Histoire de la Guerre sous Napoléon* if he has any children. I hope he has not any. It's time his line was exhausted.

My time is up.

I can only refer to the Crimea hastily. On the offensive did not our troops do well at the Alma? did the Prussians do one whit better between Gravelotte and Point du Jour? At Balaklava did not our Highlanders resist a charge of cavalry with as steady a heroism, though not in square, as any Roman legion or Macedonian phalaux, in those actions which our ingenious youth is obliged to study to the neglect of our own story so far above "all Greek, all Roman fame." Was not Scarlett's heavy cavalry charge a brilliant example of skill and courage? if the light cavalry charge was a tactical mistake was it not to the full as magnificent in its daring as the death ride of Bredow? was not the action of the soldiers at Inkermann as fine an example of victorious resistance to surprise as any in history? Thus, gentlemen, I have hastily traced the outlines of the campaigns of our race in Europe, some as exiles serving under foreign flags, most of them bearing aloft the standard of St. George. I believe that no other race has such an uninterrupted record of glory for 300 years. I say our system of education is scandalously defective. It lacks romance, it lacks imagination, it ignores our records. I hold that every Briton should know these historical facts and that all our remarkable battles should be regularly celebrated. We have not yet reached the millenium or anything like it. At a time when all the other nations of Europe are devoting all their energies and directing all their efforts to military efficiency regardless of cost, we should at anyrate let our young men know what their forefathers were capable of doing. We ought, by studying the past, to feel ourselves worthy of our ancestors, and inspired to do our duty to our descendants, to prepare ourselves for critical emergencies in the future, to be worthy of our birth, to be careful of our heritage.

> "The soul that riseth with us, our life's star
> Hath had elsewhere its setting; it cometh from afar,
> Not in entire forgetfulness, and not from utter nothingness,
> But clothed in clouds of glory did we come"
> Into our island home. (Cheers).

DISCUSSION.

CHAIRMAN—Gentlemen, the Secretary has a letter which, I believe, he wishes to read to you.

THE SECRETARY—I have here a letter from a gentleman who much regrets not being able to be present, and who, before I read it, I may say is one of the greatest authorities, of the two English speaking races, on the history of modern Germany both in private and military life and who has enjoyed exceptional opportunities of studying the German national history; his letter is as follows:—

Reform Club,
Pall Mall,
November 22nd, 1896.

MY DEAR ABDY—

I should without fail come down for next Thursday's lecture were I not already engaged in a great American function.

Particularly at this meeting of yours should I like to be present, because of the relations between Germany and this country. The Teutonic mind is to-day inflamed against everything emanating from England, notably in matters colonial and Egyptian. Germany appears willing to sacrifice a great deal for the mere satisfaction of spiting John Bull. It is at such a time, and before such an audience as the eloquent Dr. Maguire is sure to bring together, that it might be in place to rise and remind the Fatherland what Englishmen did for their liberty in the trying days between the disgrace of Jena and the triumph of Waterloo. Germans to-day need sadly to recall that in those years England generously sent to her not only arms and ammunition, but money as well—even at times when the King of Prussia was an ally if not a vassal of Napoleon. It might perhaps be useful to remind the warlike politicians of to-day that in 1813 Prussian troops marched against France clad in British uniforms, armed with British muskets and fed at the expense of British taxpayers.

But I have already bored you enough, so good-bye.

Your friend,
Poultney Bigelow.

CHAIRMAN—Gentlemen, I call on Major Murdoch to speak next.

MAJOR (Q.M.) R. H. MURDOCH, R.A.—General Maurice and Comrades: you will, I am sure, quite understand how much I need your indulgence in rising under a weighty sense of the responsibility and the honor of being called on at this point to offer some observations. I shall, however, endeavour not to go beyond the end of the XVII. century—the first of the three centuries of history compressed so marvellously in the lecture this evening. I have had sufficient experience of Dr. Maguire's general accuracy of research to avoid attempting any corrective criticism; and the highest compliment I can pay him is by contributing my mite towards enhancing the professional value of his very interesting lecture. But as the lecturer has gone over the whole range of the sciences—general history, geography, topography, strategy, tactics, not forgetting politics—there only remains for me—

"Of the *Arms*, and of the *Man*, to sing."

Dr. Maguire has displayed much acumen in taking for his starting point the end of the *Seventy Years' War*, the true dividing line between ancient and medio-modern European history—a war which inflicted a mortal but lingering blow against the weapons of the old world, panoplied armour of chivalry, Scythian chariots with scythed wheels, javelins and pikes, bows and arrows, cross-bows

and battle-axes, Boer läagers, and last, not least, the primitive sling and stone of the Huguenot war at close of the XVI. century. The *Arm* which did it was that of gunpowder. The *Man* was Alva, who through sixty years of continuous warfare never suffered a defeat, never met with a surprise; who cut through Hungary, humbled Don Jon of Austria, drove the French out of all Italy, conquered the Pontificial States, conquered Portugal, subdued Spain, and made of the whole Netherlands a howling wilderness, leaving only a small corner of Holland and Zealand as a buttress against this Dictator of Europe; who, by his brutal persecutions of the protestants, gave to England the thousands of Walloons and Flemings who laid the foundation of our international supremacy in the commercial industries and in the mechanical arts and sciences. We owe also to Alva's sieges the lesson of the immense superiority of shell fire, over solid shot of whatever calibres, even with such crude weapons as bombs and hand grenades.

That martial planet passed away on the eve of the Armada which he had contemplated, and for one hundred years Europe could gaze only at his satellites Spinola, Prince Maurice, and Turenne. For one hundred years Europe had to wait for another planet, *Marlborough*, whose satellites were Friedrich, Napoleon and Wellington.

"The Invincible Armada" has necessarily been but slightly alluded to by the lecturer who, however, rightly discriminated naval actions of the period as those of *Sea Armies*—for there were not then *Navies* in the modern sense of the term, ships of war being like unto country houses waiting for occupation by their owners; and were not complete until a land army was embarked, the land General becoming the sea Admiral. In absence of an "Army Records Society" corresponding to the "Navy Records Society," or even a Chair of Military History in our military academy, such lectures as these of Dr. Maguire must continue to be our classics; but, from the State Papers of Queen Elizabeth which have been recently published by the Navy Records Society, in Vols. I. II., three facts have been elicited: (1) that from beginning to end of the Armada not one English ship *boarded* an undisabled Spaniard; (2) that the English ships kept beyond *musketry* range of the undisabled Spaniards; (3) that of the entire Armada about one third was destroyed by the elements, one third was disabled or sunk in action, and the remainder escaped to Spain because our *artillery* gunpowder had become exhausted. Will the lecturer, therefore, now display sufficient personal courage to risk being "swung up to the yard-arm" by deciding to which of the three arms is due the effective credit of the active defeat of the *Invincible Armada?*

The year 1600 opened with the Charter to the East India Company, which forms an epoch in *arms* because one clause gave to England a virtual monopoly in Asiatic *saltpetre*, infinitely superior to the productions of Europe or Britain; and, almost simultaneously, came our invention by one of our Flemish exiles of the process of refining saltpetre—the effect of which was to almost double the range and efficacy of English gunpowder arms, both great and small, which enabled us to defeat the French, Dutch and Spanish navies and to render England mistress of the seas.

In 1624, the celebrated siege of *Breda*—around which the princes and engineers of Europe gathered—was not only a remarkable illustration of Dr. Maguire's contention of the prowess of British *soldiers* in the wars of the continent, but it is for all time memorable in the history of *arms*. On the one side was the catholic army of Spain, commanded by Spinola, whose right consisted of the Irish army under the Earl of Tyrone, with the Irish artillery train under Captain Barry the historian: on the other, the army of the Dutch protestants, commanded by Prince Maurice, whose right consisted of 20,000 English under Lord Vere of Tilbury, the then Master-General of the Ordnance (15,000 infantry, 5000 cavalry

and 20 pieces of ordnance, *i.e.*, one gun per thousand), with the English artillery train under the famous Captain Morgan. It was at this siege that Spinola, in despair at his solid shot falling harmlessly at 600 paces, *i.e.*, 1000 yards, discerned and first employed in Europe the arm of the then future—the deadly 8-in. howitzer (recently invented in Holland by Count Mansfield who was in English pay): but for nigh one hundred years no other general in Europe rightly understood the value of shell fire until it became in the hands of Marlborough the all-conquering arm for both Field and Siege Artillery warfare.

Of the great Civil War, which broke out in 1642, I would rather not talk. The parallelism of history, then and now, is so obvious and so vividly realistic in matters of army administration as to involve topics too delicate for me to discuss. But there are some practical lessons deduced from the *arms* and from the *men*. The Parliamentarians seized the trains at the Tower, Hull and Chatham, which each consisted of 12-prs. of 14 to 12-cwt., 6-prs. of 6-cwt., 3-prs. of 3 and 2-cwt., mortars to 10-in. and hand grenades (no howitzers); but there were no regulars nor veteran troops in the kingdom, as of the 20,000 recently sent to Holland only some 300 returned before the Restoration. "Sergeant-Major-General" Shippon —the parliamentary Adjutant-General—could neither read nor write; and the noble Earl who was royalist Adjutant-General was similarly gifted. Forts and feudal castles were captured, not so much by solid shot as by the destructive demoralisation of bombs; and only once was there a regular Field Artillery battle. The last fortification to hold out against the parliamentarians was Elizabeth Castle, Jersey, against which a sea army had essayed in vain, and a land army lay before it impotent; but it remained for Lieut.-Fireworker Thomas Wright of the artillery to embark for Jersey from the Tower of London in a sloop, accompanied by his mate and a 14-in. mortar with bombs. Building his platform at one mile and a half range, Lieut.-Fireworker Wright sent one bomb into the church and another into the magazine below, which, blowing up and setting all on fire, the garrison compelled the Governor to surrender—for in those days there was but one magazine for all *munitions de guerre* as well as *de bouche*. Lieutenant Wright sent his bill into Oliver Cromwell. The job cost £40!

After the Restoration came a period of intense activity in manufactures—a revolution in fact. Charles had been for many years a shrewd observer in exile on the continent, where artillery had become an arm and a science (shell guns excepted) while still with us at home a mechanical art; and the King brought over an army of Flemish artificers. About 1670, when Lord Roberts was commanding in Dublin Castle, a new train had been sent over to Ireland owing to discovery of a process of hardening brass (bronze) guns by tin to give the metal almost the tenacity and penetration of iron, while continental guns remained of the softer material which drooped or twisted after few rounds. This was the first army corps train which Marlborough took into Holland at close of XVII. century; but there was not in 1670 a howitzer; in 1698 the first batch of bayonets was also sent to Ireland to replace the dagger or snaphaunce musquet; and about the same time Marlborough revived the howitzer. Of the battles and sieges in Ireland at close of the century, the only valuable professional accounts are to be found in Vol. II. of Lord Wolseley's "Life of Marlborough." Why was it that in every field battle fought by Marlborough the British *infantry* were repulsed once, twice, and occasionally thrice, before victory, "by the superior (small arm) fire of the French;" whereas in each of these battles the British *artillery* although outnumbered by four to three in guns silenced the artillery of the enemy? I maintain it was because (1) the French were all armed with the musket bayonet, while all but our first army corps and grenadiers had only the old snaphaunce musket, which required the dagger to be removed from the muzzle to admit of

firing; (2) that Marlborough had, however, completed the re-armament of his artillery by reviving the field howitzer, which with the French (called *obus*) remained neglected since the days of Spinola—half of his field and siege trains being shell weapons; (3) that English powder 'guns and gunners were infinitely superior to any on the continent.

I have done. I must not cross the Rubicon year 1700; but have said sufficient for my purpose, which is to invite you to share with myself in three bare convictions:—

(1.) Race courage in troops is essential to the success of a commander.

(2.) Dr. Maguire has this evening conclusively demonstrated, through three centuries of European history, that this essential virtue is pre-eminently possessed by natives of Britain—particularly by the lecturer's compatriots.

(3.) Above all. That progress, the arts, the sciences, are ever preparing newer and better *Arms* for the coming *Man;* and that *Man* is he who, having discerned the best arm for his purposes, has the capacity, in the propitious "hour," to employ that arm to its best advantage (applause).

Chairman—Gentlemen, Major Simpson will now say a few words.

Major C. R. Simpson (Lincolnshire Regiment)—General Maurice and gentlemen, I do not know if I can add anything of interest to what Dr. Maguire and the officer who followed him have said, but I should like to express the interest with which I have listened to the lecture and, as an infantry officer, to thank the Royal Artillery Institution for being allowed to be present. The impression which Dr. Maguire's lecture has left on my mind is not one of unalloyed exhilaration, because whilst the history of the exploits of our forefathers cannot but stimulate us to maintain the prestige which the British soldier has won in Europe, it is hard not to feel the responsibility of having so high a standard of military excellence to live up to. Dr. Maguire referred to the "Invincible Spanish infantry"—the oblivion which has almost overtaken it is a reminder that constant effort is needed to maintain the prestige we have inherited. I do not wish to be misunderstood, I am not a pessimist, far from it, but listening to a lecture of this kind, not merely as a student, but as a practical man, responsible in a limited sphere for the training of troops who may be called upon to play their part in the future, I cannot but be sensible of the duties which such a history entails on those who have to continue it.

On one thing at least we may safely congratulate ourselves and that is that we belong to the same race as those we have heard of to-night, so that the material of which our armies are composed is excellent. Tommy Atkins has shown not only by what he has recently done wherever he has been tried, but also by the great interest he takes in military training and in any military history by which it may be illustrated, that he is not less soldierly nor less patriotic than his forefathers. I think that is a most hopeful sign for the future. Dr. Maguire, at the conclusion of his lecture, expressed the opinion that the whole nation ought to be well instructed in our national military history. In that opinion I heartily concur, and think that, as officers, we are most favorably situated for carrying out, in the part of the nation, the army, to which we belong, a share in that work.

A couple of years ago I was about to leave my regiment in order to go to the Staff College as a Professor and I gave a lecture to the men of the battalion on the history of the regiment to which I have the honor to belong. At the conclusion of it an officer said to me: "Well, Tommy Atkins does make, I think,

the most appreciative audience you can get; you will find it a very different thing when you get to the Staff College." I think that Staff College audiences are not as unappreciative as might be inferred from that officer's remark, but it was right no doubt in so far that the rank and file of our army do take great interest and that time is well spent in giving instructions in military history—I mean of a character suited to their requirements; and it was with that in my mind, as a practical officer engaged in the training of troops and looking out for ideas, that I came to this lecture of Dr. Maguire's, which has given me great pleasure to hear and for which I am very much indebted to him and the Royal Artillery Institution.

Colonel F. A. Yorke, R.A.—Gentlemen, I only wish to say, with regard to one point that was mentioned by Dr. Maguire in the course of his very interesting lecture, that the battery of artillery which took part in the great battle of Vaux, 17th April, 1794, he referred to is now, I believe, No. 5 of the Western Division. It is mentioned in Colonel Duncan's book that after that battle was over the Duke of York formed up the whole of the army and made the battery march past him in recognition of its great gallantry. In this battery, which I had the honor of commanding for five years, we purchased a silver shield, to which all the officers, non-commissioned officers and men subscribed and on it was engraved all the battles. This battery had taken part in over 50 battles and sieges. The shield was kept in the sergeant's mess and on Christmas day and general's inspection it was put in the sub-division that had the best marksmen and on guest nights it was placed on the officers' mess-table. The other day I got a letter from India saying that the centenary of the battle (a short history of the battery has been written by Major W. Tilden, R.A.) had been held. Then the lecturer mentioned the politeness that was displayed between the two armies at Fontenoy. An officer who was in the Army of Occupation had a quarrel one night with a French officer and it was settled that they should fight a duel. The English officer did not know anything about fencing, but they went out to a quiet place the next morning and the seconds put them in position. The French officer, in the usual manner, bowed to the right and then to the left and the English officer took that opportunity to run him through. The French second said he had acted unfairly, but the Englishman replied he was very sorry, but he thought the gentleman had begun (laughter).

Major E. S. May, R.H.A.—General Maurice and brother officers, when Dr. Maguire asked me to-night to add to what has proved so singularly interesting a lecture some gleanings of my own as regards the actions in which our artillery have particularly distinguished themselves during the last two centuries, even though he limited me to Europe, he really set me rather a difficult task. Because, if I may say so without undue pride, guns have been in the thick of the fight so often and in so many places during that period, and have so frequently distinguished themselves that selection from amongst their achievements is by no means an easy thing to undertake. During the past century, however, there were some deeds done by artillerymen which, I believe, I may hold up to special admiration without fear of any critic gainsaying me. The career of Albert Borgard belongs to that period, is full of shining and instructive examples for us and is identified with much of which one may be proud. The expedition to Cadiz in 1702 marks the opening years, and we should note that one too which sailed for Spain and the bombardment of Vigo in 1719, because that was the first occasion on which batteries, or rather companies, were engaged as units of the one great Regiment, which had just been created and which we call "our's" still. The year 1727 is identified with the name of Colonel Jonas Walton and the siege of Gibraltar, in 1743 was fought Dettingen, and in 1746

Culloden, in both of which battles the guns had a great share, and in the latter of which, although the fact is not often remembered now, they largely contributed to the victory. But Minden, fought in 1759, is the name that should be in every field gunner's mind when he thinks of the last century, and it was at that battle and at Warbourg, which followed it a year later, that the first promise of the present great mobility of Field Artillery was first displayed and that the independance of our arm asserted itself. And for the less mobile portion of the Regiment there is nothing in the last century to compare in interest with the great siege of Gibraltar. That magnificent defence and triumph of British determination, which is fitly matched by the equal courage, persistancy and skill displayed during this century on the attacking side throughout the great siege of Sebastopol. The struggle at Gibraltar was the longer of the two. It lasted for three years, seven months and twelve days, and during these were exhibited, in the words of General Eliott, afterwards Lord Heathfield, cheerful submission to the greatest hardships, matchless spirit and exertions, and on all occasions an heroic contempt of every danger. And we have the equally eloquent words of the Duke of Richmond, then Master-General of the Ordnance, to assure us that the services of the artillery were pre-eminent amongst those of the other troops engaged. It would need far more time than is at my disposal now to dilate on even one of these great events of the XVIII. century, and I must speak too of those which have occurred during the one in which we live. The close of the last century marked an epoch in the history of our arm, in that Horse Artillery was then first called into existence, and during the early years of the XIX. century it was that arm, owing to its great mobility, which came specially to the front. But our siege batteries did a vast deal also, and their performances must not be lost sight of when we note special events connected with our arm. Dr. Maguire has mentioned the Walcheren expedition. That is an expedition concerning which, as he says, we in England have not much to be proud, but although it was not a success, a sound strategical idea underlay it, and the capture of Flushing, although it only half completed the work, was of some value and for us gunners it is worthy of notice, inasmuch as it was a very great artillery expedition indeed, for there were 16 companies and a battery of Horse Artillery sent out with it, and the Deputy-Adjutant-General of Artillery, then General Macleod, was invited specially to take the command of them himself. The expedition was not well conducted, but we need not fear to speak of it all the same, for those companies did extremely well even if deficient leadership did not turn their efforts to the best account. The destruction of Flushing by the artillery was no small matter, and the Earl of Chatham has written in his despatch these words: "It is impossible for me to do sufficient justice to the conduct of the officers and men of the Royal Artillery under the able direction and animating example of Brigadier-General Macleod." Then there was the battle of Barossa on the 5th March, 1811, in which there were only 10 guns engaged but they were never idle and were always in the right place. That battle only lasted an hour and a half, but in that time General Graham defeated Marshal Victor, capturing 400 prisoners and six guns; he fully acknowledged the services which the guns did, and in his despatch he says, "*never was artillery better served.*" Then in the same year, 1811, we have the battle of Fuentes d'Onor, and whenever gunners refer to artillery achievements, that is one which we may always expect them to mention. The deed of Ramsay's was indeed a very gallant one and no wonder that it is so much admired. To my mind, however, it was not a very great artillery achievement, nor a legitimate triumph for our arm, because it did not throw any great light upon artillery tactics, nor add to our knowledge of how to handle guns. Then in the same year at Albuera the artillery distinguished themselves, because they worked so well with the other

arms, and especially did "D" troop signalize itself in its work with the cavalry on the right of our line. It is a particular pleasure to mention that battle here to-night because we have our friends the 3rd Dragoon Guards in the garrison at this moment, and it was that regiment and the 4th Dragoon Guards which so effectively co-operated with the Horse Artillery on that celebrated and bloody day. We must not fail to remember the battle of Vittoria either, which is perhaps the greatest artillery battle we have ever had, and is certainly the one during the Peninsular war in which our guns bore the largest share. That was so chiefly from the fact that, owing to the few roads, the artillery became, rather by chance than good guidance, concentrated under the hand of Sir Alexander Dickson, was handled in masses against our usual custom, and produced an unprecedented effect in consequence. The battle was remarkable too from the fact that the whole of the enemy's artillery was captured and every one of the guns on our side were brought into action, a thing rare in those days of reserve artillery. For their services at Vittoria the artillery officers got a special pension, which, by the way, did not stand them in very good stead in the long run, because it aroused certain jealousies on the part of other officers and caused a large amount of irritation on the part of the Duke of Wellington, an annoyance which he showed afterwards in a celebrated memorandum he wrote about the artillery at Waterloo. The mention of that most decisive of battles reminds us of the stern front our batteries showed there, but that is so well known that I need not dwell upon it now. After 1815 there was the long peace and the next great event in our military history was the battle of the Alma. At that battle the most noticeable performance was the action of the two 9-pounders of Turner's battery which were brought up almost into the Russian position, from there enfiladed the Causeway battery and had a great influence on the course of the fight. They were manned by officers, amongst whom was Sir Collingwood Dickson, and Lieutenant Waltham was killed in the act of sponging one of them out. Thus we are brought up to Inkermann, and again that action is noticeable for the great effect that was produced by the two 18-pounders from the siege train brought up by Sir Collingwood Dickson and Sir Charles D'Aguilar, who are still happily with us. The rest of the Field Artillery did excellent service too, and General Todleben has recorded his opinion of it when he says: "The English artillery sustained its infantry perfectly. It followed it everywhere and opened a close fire on the Russian columns." But, gentlemen, the greatest and most memorable event of the Crimean war was the siege of Sevastopol and that was an operation in which the Garrison Artillery pre-eminently shone; and it may be its boast that it gained its laurels in what is probably the greatest siege in history, certainly in our history, and distinguished itself in the attack as artillery had done before in the defence during that other great siege to which I have already referred. Now during this siege of Sevastopol an incident occurred which I confess I myself knew very little about until I read the last volume of Kinglake when it came out some years ago, and then I rubbed my eyes and wondered if it could be true, I was so much astonished. I daresay some of you are not familiar with it even now, but it is an incident nevertheless that we should all be familiar with. During the bombardment in April 1854 two batteries, styled Nos. 7 and 8, had been built in the third parallel of the left attack, within some 700 yards of the Russian battery, known as "the Crow's nest." It was impossible to get down guns to them during daylight, and such work was by no means easy at night owing to the roughness of the ground and the mud and wet. The gunners, however, were equal to the task and during the nights of the 11th and 12th they got the guns down to the batteries within, as I have said, 700 yards of the Russian guns. Captain Oldershaw, with 65 men,

went down on the 13th to man those batteries which were now armed with four 32-pounders. They had been engaged with the enemy the previous day, but had not accomplished very much nor suffered a great deal. When Oldershaw, however, went down with these 65 men, after a cannonade of about two hours, he silenced the "Crow's nest" and "Garden" batteries. Then the Russians concentrated about 30 guns, very many of them of very heavy calibre upon his and he fought this great preponderance of Russian guns for three hours more. Of the 65 men who went into the battery, Oldershaw took 18 to act as stretcher bearers and carry away the wounded, so that there were only 47 men left to actually fight the guns. At the end of the five hours of these 47 men, 44 had been killed or wounded, and even then Oldershaw and the three men that were left did not show any intention of quitting the battery until an order was sent them to do so. Three of their guns meanwhile had been dismounted some time previously and at last the fourth was disabled also. When Oldershaw and his little band were at length ordered to leave this scene of destruction, the three guns that had been knocked over by the Russian shot were lying on the ground with their muzzles in the air; they loaded up those guns and the last thing they did was to fire a salvo of defiance from them to the enemy. Well, that was a very gallant performance indeed, but it was eclipsed the next day when Captain Oldershaw was ordered in error to take in fresh gun detachments and go into those wrecked batteries and fight them again. The men who had been with him the day before happened to hear what was going on, and, when Captain Oldershaw went on parade on the morning of the 14th, the 18 men, who had been stretcher bearers the day before, and the three other survivors of the fight fell out, and they insisted upon their right to go with him and fight the guns over again. Now the action of the men in making this claim brought to light the circumstance that Oldershaw had been detailed for the duty through a mistake, and as, I suppose, it was hardly fair to ask the men to go again, another officer was sent down with the new detachments. It was no use, however, to persevere in the contest and both those batteries were eventually again silenced and were not subsequently manned. As I said before I personally knew nothing whatever about this brilliant exploit until comparatively recently, and when I read it I was quite astonished. The other day, however, I came across it again in another book by Sir Evelyn Wood, who has published his memories of the Crimea, and he tells the whole of the story much to the same effect as Kinglake. He was present at the siege, and he tells it from his personal knowledge, and I would like to read you an extract about this episode which I made to-night out of Sir Evelyn's book. He says: "The British soldier does not often require speeches to raise his courage on going into action, but every one of us is the better for the contemplation of heroic deeds, and were I a Royal Artilleryman I should try so to record this achievement that young gunners might learn the names of those three survivors of the five hours' artillery duel on the 13th April, who, having seen 93 per cent. of their comrades fall, begged for permission to re-commence with their Captain the same deadly work on the following day. Several speakers have dwelt upon the value there is to be derived from reading gallant deeds such as this. I think it is time that the attention of our officers in garrison batteries was directed to this one in particular. I do not understand why it is not more celebrated in our annals, for, so far as I am aware, no braver or more honorable achievement is to be found in the whole of our military history. Nor for the matter of that do I believe that it can be surpassed in the history of any nation. We hear over and over again of Norman Ramsay, we are all at home about Mercer's battery at Waterloo and we have had that scene painted for the mess at Aldershot, we have heard too of the "battery of the dead" that so unselfishly covered the Austrian retreat at

Königgrätz, but no one ever speaks of the conduct displayed by Oldershaw and his men, and yet none of the performances I have mentioned surpasses theirs. But I am glad I have had the opportunity to refer to it now. I have often had to speak of Field Artillery and of its performances, but I hope I have not overlooked all that the other branch of our Regiment has done; for I feel that whatever branch we may belong to we must, as gunners, all take a pride and interest in such a feat as I have just described, and it should be a great satisfaction that we have all of us a share and an inheritance in the glorious deeds which our predecessors carried through with so much credit to our cloth.

REPLY.

Dr. Maguire—General Maurice, I must congratulate myself on having been able to elicit such admirable speeches as those to which we have just listened—admirable from every point of view as displaying great historical knowledge and a fine spirit and desire to raise the tone of the humbler ranks of the service. I may as well explain, gentlemen, that these red marks [1] represent about one-sixth of the actions in which the British have been engaged from 1558 to 1856 on the continent of Europe. With regard to what Major May said, really I have nothing to criticise; everything he said I am sure is perfectly accurate and I am very much indebted to him for supporting me so well. He referred to some of the very greatest battles in which the British officers have fought and he referred to Barrosa. Well, the artillery did very well there. The charge was sounded by Paddy Shannon. Paddy Shannon was not a man of much education and he got into bad habits after the Great Peace. He was about to be flogged in Ireland and he said to Colonel Gough, "Are you going to flog Paddy Shannons, I the boy that sounded the charge that got you the eagle for the regiment?" "Take him down," said Colonel Gough.

Then the speech of Colonel Yorke, though short, was very much to the point. He mentioned the action of the 5th Company of the Western Division. Here were great men struggling in adversity. Lord Bacon says a good retreat is equal to a great advance, and certainly this battery deserves, with its record of 50 actions and sieges, a good niche in the Temple of Fame.

Then the speech of Major Murdoch was really a very remarkable one I thought, and contained a wonderful amount of information with regard to a class of officers about whom little is known, including men like John of Austria and Spinola and others; and a peculiar feature with regard to the "invincible Spanish infantry" mentioned by another officer was that it was recruited from men of every nation —any man that was distinguished for "derring doe" was commissioned in the old Spanish armies. This state of things long continued. Prince Eugene was no Austrian, and at the battle of Fontenoy the commander of the French was Marshal Saxe, a Saxon, but I do not agree with another gallant Major that the British nation should think it is going to fail because the Spanish nation failed. We must not give up encouraging our men, and why should a nation think it is going to fail? I am sure Major Simpson's spirit in speaking of Tommy Atkins and wishing him to be imbued with the knowledge of what his predecessors have done is an excellent spirit and that he is in Major Simpson's hands under very competent and inspiriting instruction. Then, gentlemen, with regard to what another officer said as to the army serving on the sea; of course Major Murdoch was

[1] On large wall maps.

absolutely right in saying that there was no corps of marines; the sailors were ordinary seamen. The Captain that did the navigation was one person and the Captain that did the fighting was another person. Blake was at first a landsman. Even in the campaigns of Charles II. against the Dutch one of the commanders in the great battles in the channels was General Monk, but General Monk had been a previous commander of the Coldstream and one of Cromwell's Generals; and certainly the Duke of York had distinguished himself in that very battle of the Dunes, fighting against his country on that occasion, I am sorry to say. Gentlemen of the Court used to volunteer to go and serve as soldiers on board our fleet in those days.

Gentlemen, it only remains for me now to thank you exceedingly for your attention and I hope the British army for 300 years more will do as well for its country as Britons have done in the 300 years which were my theme (cheers).

Chairman—The duty of summing up, which now falls on me consists, I presume, in reconciling such points of difference as may have arisen between the lecturer and those who have followed him. As there appear to be practically none, that duty lapses. Our lecturer has in his eloquent way run over in a very compressed summary a most enormous field, both in point of time and space. It would be absurd to attempt yet further to condense so very closely packed a summary as he has given us. There are some points of detail with regard to which, as he has hinted, I am not in entire agreement with his statements, but they are very small matters. For instance, I think while it is only right that we should do justice to ourselves, it is very important that we should give to those that were our young allies at the time of the battle of Waterloo all such credit as we can give them and not allow the temporary irritation of the hour, for which neither those brave and loyal comrades of the past nor the Prussian officers of to-day are in any way responsible to make us do injustice to those who fought side by side with us in that great field. As a matter of fact, it does not represent an accurate statement of the facts to say that the pressure which the Prussians brought to bear upon the field of Waterloo began at 5 o'clock in the afternoon; it was from 3 o'clock that their presence on the battle-field began to draw force from the French side, but the whole story is much too long and much too complicated to discuss now. Still I am very anxious that we should not, simply because we have had a hasty telegram sent out into the world, do any injustice to those who fought side by side with us, as our excellent lecturer has pointed out to you so well, not only at Waterloo, but in campaign after campaign over and over again.

I am afraid that I must just touch upon one point in order again to do justice to that side of the question. The lecturer spoke most admirably about the services we rendered to them during the early days of the Prussian Monarchy. These are by no means forgotten by Germans, especially not by German officers who, in my experience, invariably receive English officers as true comrades in arms. Unfortunately our union with them during the Seven Years' War ended by our deserting them owing to one of those unfortunate changes in politics which do take place, without any fault of us soldiers, in England as well as in Germany. However, with those very slight exceptions I accept, with much pleasure, all that Dr. Maguire has said to us this evening. To turn to the discussion, I do not think that any of us ever hear Major Murdoch without going away wiser and gaining a great deal from all that he has to tell us; but, again, a summary is absolutely impossible. All he says is crammed full of solid facts and therefore there is no possibility of compressing it further.

I am afraid my sympathies are not so strong with regard to the actual expression of Major Simpson's sentiments. I am sure he only intended to give us a wise warning that we must not merely trust in the past but work for the future, but the turn of his phrases might easily lead to an impression that would be very

disastrous. I totally disbelieve that there is the smallest danger that, if we are to do our duty by him, the English recruit will not make as good a soldier as ever he was in his past history. I cannot pretend to say that I think we ought, for one moment, to lead them with the slightest hesitation or the slightest doubt. If we fail we fail, but if we bring our courage to the sticking point, in regard to our confidence in them and our care of them, we shall not fail.

Colonel Yorke gave us some most valuable reminiscences of the two companies which he mentioned; and I, at all events, am personally particularly grateful to Major May for what he said, because it so happens that I am able to add one little point to it which I think will enhance its value as regards the very gallant officer of whom he spoke, General Oldershaw. It so happened that I reviewed in Macmillan's Magazine Kinglake's book when that volume which contains the story of Oldershaw's siege battery came out. Like Major May I was struck by it as at least one of the most glorious achievements in the whole history of war. My review led to my having a good deal of correspondence with a number of officers who had been in the Crimea, and the remarkable fact was that so intensely modest had Oldershaw been about this matter that hardly one gunner knew anything about it, or was even aware that Oldershaw had specially distinguished himself. The point I wish to make is that Oldershaw's modesty had been quite equal to his heroism.

That, gentlemen, is all I have to say except that I know I may now, in your name, offer the most grateful thanks to Dr. Maguire for the very excellent lecture he has given us.

APPENDIX.

LORD PETERBOROUGH'S ATTACK ON BARCELONA, 1705.

Peterborough divided his little corps into three columns, of which one was appointed to attack a bastion that looked towards the town; and another to assault a demi-bastion on the western face; and the third to act as a support to either when needed, or to cover their retreat in case of a reverse. Each of the assaulting bodies again was thus distributed: first of all went a Lieutenant with 30 men, a sort of forlorn hope, as it is called, or advanced-guard; then followed a Captain with 50 men; and last of all came the little battalion, which mustered in all not more than 200 firelocks. The orders issued to both were the same. The men were directed to push forward, to receive the enemy's fire and then to leap into the ditch; out of which it was not doubted that they would speedily drive their opponents.

THE HIGHLANDERS.

In 1739, when our war broke out with Spain, the Government formed a highland regiment, the nucleus of which was taken from the six companies of the Black Watch. The costume was a little altered, the scarlet jacket being substituted for the darker material, and a blue bonnet, with a tuft of red feathers, made to take the place of the cap hitherto in use. A musket bayonet and basket-hilted sword constituted the arms; and those who chose it, carried a dirk, pistols, and the target or shield. In fact, excepting in a few particulars, the costume of the gallant 42nd regiment has scarcely been altered to the present hour.

Well has Dr. Jackson written: "Close charge was his ancient mode of attack,

and he still charges with *more impetuosity* or sustains the charge with more firmness; that is, disputes the ground with more obstinacy than almost any other man in Europe. Some nations, who sustain the distant combat with courage, turn with fear from the countenance of an enraged enemy. The highlander advances towards his antagonist with ardour; and, if circumstances permit him to grasp him, as man grasps man, his courage is assured.

WAR OF AUSTRIAN SUCCESSION.

Of this strength, three troops of the Horse and Horse Grenadier Guards, the whole of the Blues, two regiments of Dragoon Guards, six of Dragoons, three battalions of Foot Guards and 15 regiments of the line embarbarked for Flanders in 1742. In the following year the Eighteenth proceeded to join the army; and in 1744 nine more infantry regiments were despatched to the field of action.

THE BATTLE OF DETTINGEN, 1743.

The battle of Dettingen, though undecisive in its political results, had great effect in raising the martial character of the British soldier. The instances of individual daring which distinguished the fight are very numerous. There is an anecdote on record of a trooper of the 3rd Dragoons named Brown having had two horses shot under him and two fingers of his left hand carried away. Thus partially disabled, he perceived the standard of the regiment in peril, the cornet who bore it having been wounded in the wrist. He rushed forward—a *gens d'armes* had seized it. Brown shot him, tore the colour from his grasp and placed it between his legs while he desperately made his way back to his regiment. The French surrounded and cut at him. Eight wounds did he receive in his face, head and neck; three balls went through his broad hat and two lodged in his back! Still he bore him bravely onward and rejoined his corps at a distance of 80 yards. The ears of the poor fellow were gladdened with the welcome shouts of his comrades. The King would have given him a commission, but Brown could neither read nor write, so he was placed in the Life Guards as a compliment. As however, the balls could not be extracted, the Crown gave him a pension of £30 a year and he retired into private life with the pleasing consciousness that he had deserved well of his country.

The 21st Royal Regiment of North British Fusiliers also did themselves honour at Dettingen. When the French cuirassiers pounced upon them, Sir Andrew Agnew, deeming it impossible to withstand their charge (for the impenetrable square was not then known in the British army), ordered the regiment to fall back from the centre by right and left. The cuirassiers rushed madly into the lane they formed, believing that the line had been broken. The 21st then delivered a volley and charged the horses with the bayonet, nearly annihilating the French corps. The King did not fail to see the movement and its result. "Ah, Sir Henry," said His Majesty, pleasantly, after the battle, "the *gens d'armes* got in among you to-day!" "Yes, please, your Majesty," answered the brave Scotch knight, "but they did not get out again."

BALLAD ON FONTENOY.

"The English strove with desperate strength; they rallied, staggered fled—
The green hillside is matted close with dying and with dead.
Across the plain and far away, passed on that hideous wreck,
While cavalier and fantassin dash is upon their track.
On Fontenoy, on Fontenoy, like eagles in the sun,
With bloody plumes the Irish stand; the field is lost and won."

BRITISH COLUMN AT FONTENOY.

The Duke of Cumberland, whose bravery that day merited the highest eulogium, at the head of a great column of 14,000 or 15,000 British and Hanoverian infantry, accompanied by 20 pieces of cannon, notwithstanding the difficulties of the ground, and the destructive cross fire from the guns of the village of Fontenoy, and of the redoubt unassaulted by Ingoldsby, forced his way beyond *both*, into the French centre. "There was one dreadful hour," alleges the Marquis d'Argenson, a looker-on with Louis XV., "in which we expected nothing less than a renewal of the affair at Dettingen; our Frenchmen being awed by the steadiness of the English, and by their rolling fire, which is really infernal, and, I confess to you, is enough to stupify the most unconcerned spectators. Then it was that we began to *despair of our cause.*" And no wonder they "began to despair!" Of their infantry, battalion after battalion of their best regiments, of their cavalry, squadron after squadron gave way, shattered by the musketry, or smashed by the cannon, of that moving citadel of gallant men, from whose ranks, as having penetrated above 300 paces beyond the redoubt and village in spite of all that had *yet* crossed their path, the shouts of anticipated victory resounded over the plain! But, by this time, though its depth seemed undiminished, the column had suffered much; it looked as if astonished at finding itself in the middle of the French, and without cavalry; it appeared motionless, as if without further orders, yet maintaining a fierce countenance, as so far master of the field of battle. Like a noble bull, faced by none with impunity, and wounded only at a distance by those still venturing to wound, *there* it stood, in the midst of a hostile amphitheatre, triumphant and bellowing defiance, though weakened by past exertions and loss of blood. Had the Dutch now burst through the redoubts from Fontenoy to Antoni in support of the Anglo-German column, the French would have been not only beaten, but ruined, since there would certainly have been no escape for the mass of their army and, perhaps, no retreat even for the King and the Dauphin.

"SEVEN YEARS' WAR"—BATTLE OF MINDEN, 1759

Prince Ferdinand of Brunswick, who commanded in chief, was enchanted with the conduct of his English allies, and no wonder, for the enemy were in greatly superior numbers, and had designed the entire destruction of the little band. In the "Campaigns of Prince Ferdinand" these words occur:—

"Notwithstanding the loss they sustained before they could get up to the enemy; notwithstanding the repeated attacks of the enemy's cavalry; notwithstanding a fire of musketry well kept up by the enemy's infantry; notwithstanding

their being exposed in front and flank, such was the unshaken firmness of these troops that nothing could stop them, and the whole body of French cavalry was routed."

Numerous anecdotes are on record, illustrative of the character of the soldiery at Minden. The 20th Regiment had been terribly cut up, having had no fewer than six officers, a sergeant and 79 rank and file killed, and 11 officers, 12 sergeants and 212 rank and file wounded; yet the corps refused to avail itself of the exemption from duty, which Prince Frederick had humanely and spontaneously granted. The 20th may look back with pride on the memorable order:—

Kingley's Regiment, *at its own request*, will resume its portion of duty in the line.

NAPIER'S SUMMARY OF THE PENINSULAR WAR.

Sir Arthur Wellesley twice delivered Portugal. Sir John Moore's march to Sahagun saved Andalusia and Lisbon from invasion at a critical moment. Sir Arthur's march to Talavera delivered Gallicia. Graham saved Cadiz. Smith saved Tarifa. Wellington recaptured Ciudad and Badajos, rescued Andalusia from Soult and Valentia from Suchet; the Anglo-Sicilian army preserved Alicant and finally recovered Taragona and Barcelona under the influence of the northern operations, which, at the same time, reduced Pampeluna and St. Sebastian. England indeed could not alone have triumphed in the struggle, but for her share let this brief summary speak.

She expended more than one hundred millions sterling on her own operations; she subsidised both Spain and Portugal, and with her supplies of clothing, arms and ammunition maintained the armies of each, even to the guerillas. From 30 up to 70,000 British troops were employed by her; and while her naval squadrons harassed the French with descents upon the coast, and supplied the Spaniards with arms and stores and money after every defeat, her land forces fought and won 19 pitched battles and innumerable combats, made or sustained 10 sieges, took four great fortresses, twice expelled the French from Portugal, preserved Alicant, Carthagena, Tarifa, Cadiz, Lisbon; they killed, wounded and took 200,000 enemies and the bones of 40,000 British soldiers lie scattered on the plains and mountains of the Peninsula. For Portugal she re-organized a native army and supplied officers who led it to victory; and to the whole Peninsula she gave a General whose like has seldom gone forth to conquer.

BRITISH FORCES (NAPIER, PAGE 7).

"Very subject to false impressions are the English; and being proud of their credulity, as if it were a virtue, they cling to error with a tenacity proportioned to its grossness. An ignorant contempt for the soldiery was prevalent long before the ill-success in 1794 and 1799 seemed to justify public prejudice; the cause of those failures was not traced; the excellent system produced by the Duke of York was disregarded, and England, at home and abroad, was in 1808 scorned as a military power, *when she possessed, without a frontier swallowing armies in its fortresses, at least 200,000 soldiers*, the best disciplined and best equipped in the universe, together with an immense recruiting establishment, and the power of drawing, through the militia, without limit on the population. Many were necessarily employed in defence of the colonies, yet enough remained to furnish

a force greater than Napoleon had at Austerlitz, double than that with which he conquered Italy. In material sources also, the superiority of English mechanical skill was shown, and that intellectual power, which in science, arts and literature is nationally conspicuous, was not wanting to her Generals in war."

All this was, in addition to the immense navy, holding absolute command of every sea.

GENERAL VIAL ON THE CAMPAIGN OF 1810.

"From the campaign of 1810 we can acquire much information as to the best method of conducting defensive war. Wellington carefully prepared the theatre on which he wished to operate; he put his strong places in a good condition; he organized lines of defence on which he could, if necessary, fall back; he secured his lines of communications; he arranged for the systematic devastation of the country in the line of the enemy's advance; he created, at the far extremity of his theatre, a vast entrenched camp which enabled him to stand at bay, to face the enemy and to weary him out. Having thus prepared his ground, he concentrated his forces; he only left advanced-guards at the frontier; he placed the mass of his forces three marches away so as to facilitate the first manœuvres of his adversary. When the latter took the offensive, the English General used the strong places to exhaust and enfeeble his initiative. Then after the sieges, Wellington retired slowly, firmly and with method, neither allowing himself to be cut off, nor to be forced into fighting, and only fighting rear-guard actions on positions well chosen and so strong in themselves that success was almost assured in advance. Thus he led the enemy's army far from its base of operations, through a ruined and deserted country, where it was harassed by a cloud of partisans always hanging about it. At last the camp of Torres Vedras was reached; here he shut himself up in an impregnable fortress. Soon famine, exhaustion, isolation and despair compelled the offensive army to undertake a difficult retreat and to evacuate Portugal."

EFFECT OF THE PENINSULAR WAR ON NAPOLEON'S DESTINIES.

War with Russia by Napoleon began June 1812. In April the British and Portuguese army—for there was no Spanish regular army worth the name and the guerillas were as disastrous to friends as to foes—of 90,000 at most and perchance, I exaggerate, occupied—

291,379 men and 40,653 horses.

In the Peninsula on March 1813 were 231,000 infantry, 29,000 cavalry. The battle of Lutzen in Germany took place in May. In 1814 Wellington detained 90,000 Frenchmen in the south of France.

The French army which entered Russia consisted of—

491,900 infantry.
90,000 cavalry.
164,000 horses.

Of these 200,000 were Frenchmen.

England assisted the European powers to cope with Napoleon in 1813 by no less a sum than £12,000,000.

In 1814 the same powers received nearly £4,000,000; in 1815, £7,000,000.

THE DUKE OF YORK, *re* EXPEDITION TO PORTUGAL, 1826.

"On Saturday the decision of the Government was taken. On Sunday we obtained the sanction of His Majesty. On Monday we came down to Parliament, and at this very hour, while I have now the honour of addressing this House, BRITISH TROOPS ARE ON THEIR WAY TO PORTUGAL!"

EXTRACT FROM "MEMORIA DE ARTILLERIA," MADRID, OCTOBER 1896.—GIBRALTAR.

This Rock is to-day a thickly populated and fortified city, on which the English have impressed the stamp of their civilisation and progress.

The features of this cosmopolitan and picturesque city are good hotels, carefully-kept gardens, well-supplied shops, theatres, police, comfortable houses and a garrison of from 5000 to 6000 troops, who look upon the Spanish people more or less as if they were Indians. Its very prosperity makes us blush with shame.

It possesses two moles: the old mole in shallow water, near to which is the coal supply stored in hulks anchored at from 850 to 1100 yards from the town; and the new mole, whose length will extend to more than 1100 yards with a depth of water from 8 to 10 fathoms, thus permitting any man-of-war to come alongside. It provides workshops for repair, abundant stores, two iron foundries, means of embarkation and disembarkation and all that is necessary for a place which has dealings with all the world.

The annual sale of coal to ships amount to half-a-million tons; on an average 6400 vessels, with a tonnage of more than 5½ millions, enter the harbour.

It has constant communication with Algeciras, Tangier and Malaga, and very frequently with the most important parts of the world.

Situated on the east mouth of the Strait it is for England, the possessor of a powerful fleet, the key of the Mediterranean. It forms with Malta an exceptionally good base of operations, giving her the predominance in this sea, which is the mother of civilisation. If she were to abandon or lose Gibraltar her influence on the destinies of Europe would be of less weight; her alliance, in the highest estimation to-day, would, in the event of a conflagration, lose its value, and her position as a nation of the first class would not hold the eminent place which it now occupies in Europe.

INKERMANN.

A little after five, Brigadier-General Codrington, while visiting an outlying picket, heard the cold, sharp rattle of musketry down the hill, and the Russians, whose grey great-coats were wreathed in dense morning mists, were now found to be advancing in great force. Still the rain fell, and the fog, thickened by the dense smoke of the firing, rendered every object still more imperceptible, but trumpet blast and the roll of drums and the booming of artillery now commencing as the men were endeavouring to light their fires, put every one in motion, and the gigantic conflict began in earnest, which, being now known by rôle to every reader, we do not presume to detail at second-hand.

There was a certain redoubt on the hill, however, which it was the object of the Russians to take, and of the English to hold, and this was hotly contested for. A body of the Fifty-fifth were forced to retreat from the overwhelming odds of

forty to one; but the detachments of the Forty-first and Forty-ninth came gallantly to their rescue, and again obtained the mastery of that position, and for a while, despite the deadly batteries and the multitudinous infantry of the Russians, they stood their ground till again forced by accelerating numbers.

The Duke of Cambridge, while the artillery on the opposite hills thundered and pounded away amidst vivid cataracts of flame, brought up the Guards, who charged this redoubt as if, besides life, immortality was to be won. They were successful, and a few hundered men set at defiance 7000 of the enemy who, three several times, sought to recover what they had won and lost. And here, in fact, occurred perhaps one of the most splendid episodes of the morning. Back to back on that bloody ground, sodden into a hideous quagmire, the gallant Coldstream fought against an infuriated multitude till their ammunition was expended, and then clubbing their muskets, by dint of blows from stock and stone, they drove the Russians back far enough to obtain room to form in line, and with level bayonets charged the retreating masses and again rejoined their comrades.

Meantime, while 12,000 English soldiers fought hand to hand and with crossed bayonets against a host counting upwards of 40,000 trained men, the Russians were picking off the officers as a sportsman selects his game.

THE 15TH HUSSARS AT VILLARS EN COUCHE.

The allied forces, under the Hereditary Prince of Orange, were besieging Landrecies. The French, in order to interrupt their operations, advanced from Cambray as far as Villars en Couche. They dislodged the Hessians and drove them from the river Celle, thus stopping the communication. The French were 20,000 strong. Undismayed by their numbers, Captain Ryan, with two squadrons of the 15th Light Dragoons and two squadrons of hussars, charged them vigorously, killed about 1000 men and took three pieces of cannon. The communication was thus re-established with the Hessians, and the right wing of the besieging army at Landrecies recovered. The German Generals, Stentkeresky and Count de Meoveldt, were warm in their praise of the gallantry of the dragoons, especially as it had saved the Emperor of Austria from being made prisoner by the patrols of the French on his way from Brussels. More acceptable, however, than the laudation of the German Generals was the approval of the Duke of York, who added, in his general order eulogizing the 15th Dragoons, that "they charged the enemy with the greatest success, and finding a line of infantry in the rear of the cavalry, they continued the charge without hesitation, and broke them likewise; and had they been properly supported, the entire destructiou of the enemy must have been the consequences."

THE TWENTY-EIGHTH AND THIRTY-THIRD REGIMENTS IN 1793–4.

The 33rd Regiment gained laurels for itself in Holland; nor could it be otherwise, commanded as it was, by the immortal Wellington, the Lieut.-Colonel Wellesley. Retreating after a night attack on Bextel, General Abercromby directed the Thirty-third to cover the Guards as they retired. This was the first time in which the great Duke was ever under fire, and he shared with his gallant corps in the coolness with which the pursuing cavalry of the enemy were met and repulsed. The Forty-second, Forty-fourth and Seventy-eighth likewise behaved

with great steadiness in Holland, especially at Geldermalsen and on the banks of the Waal. The Twenty-seventh and Twenty-eighth also earned most honourable mention. When new colours were given to the Twenty-eighth in March 1832 by Sir Edward Paget, their Colonel, and presented to the late gallant Marquis of Anglesea, the latter, in enumerating the services of the corps from the time of Marlborough, alluded to their conduct when in the Low Countries in 1794. "I well remember," said the Marquis, who, as Lord Paget, had commanded the light dragoons, "an order of Lord Carthcart's, upon the occasion of his detaching, for a particular service, the Twenty-seventh and Twenty-eighth Regiments. It ran thus: 'Whenever danger is to be apprehended, and difficulties are to be encountered, the Twenty-seventh and Twenty-eighth Regiments are sure to be called upon,' etc., and true it is they were never called for in vain. Whatever were its difficulties, however it was harassed or distressed, it (the Twenty-eighth) always turned out stronger than any other corps."

THE HIGHLANDERS.—BERGEN, 1799.

The 23rd, 55th and 92nd Highlanders, gained for themselves an imperishable renown at the battle of Bergen on the 2nd of October. Owing to the admirable behaviour of the Ninety-second, General Moore, when he was made a K.C.B., took a soldier of the regiment as one of the supporters on his armorial bearings, and a lion for the other.

BARON MÜFFLING ON THE BRITISH SOLDIER.

Of the British infantry, Baron Müffling, writing chiefly with reference to his observations of the Waterloo army, said: "There is not, perhaps, in all Europe an army superior to the English in the actual field of battle. That is to say, an army in which military instruction is entirely directed to that point as its exclusive object. The English soldier is strongly formed and well fed, and nature has endowed him with much courage and intrepidity. He is accustomed to severe discipline and is very well armed. The infantry oppose with confidence the attack of cavalry and show more indifference than any other European army when attacked in the flank or rear. Such an army as the English is most precious for those they may act with, as the most difficult task of the modern art of war is to form an army for pitched battles."

POPULATION.

England end of 16th century	... ...	5,000,000.
British Isles, 1712	... ...	9,080,000.
,, ,, 1780	... ...	11,000,000.
,, ,, 1800	... ...	15,000,000.
,, ,, 1811	... .	17,000,000.
,, ,, 1854	... ...	27,000,000.
,, ,, 1896	... ...	40,000,900.

REVENUE.

Time of Elizabeth	in	present	value...	...	...	£1,500,000.
,, ,, Anne	,,	,,	,,	...	...	...	£11,000,000.
1800	,,	,,	,,	...	...	...	£50,000,000.
1851	,,	,,	,,	...	...	...	£61,000,000.
1894	,,	,,	,,	...	...	...	£91,000,000.

A LIST OF THE PRINCIPAL OPERATIONS IN EUROPE IN WHICH THE BRITISH ARTILLERY HAS DISTINGUISHED ITSELF SINCE 1700.

1701.—Expedition to Cadiz.
1702.—A train of artillery landed in Holland under Marlborough.
1703.—Expedition to Portugal.
1704, August 13th.—Battle of Blenheim.
1706, May 23rd.—Battle of Ramillies.
1708.—Capture of Minorca by General Stanhope.
1708, 11th July.—Battle of Audenarde. Siege and capture of Lille.
1709, 11th September.—Battle of Malplaquet. Siege and capture of Tournay.
1710.—Siege and capture of Douay.
1711.—Siege and capture of Bouchain.
1719.—Expedition to Spain. Bombardment of Vigo (this was the first occasion on which the artillery *as a regiment* saw active service).
1727.—Siege of Gibraltar (the R.A., under Colonel Jonas Watson, during a four months' siege, greatly contributed to the successful defence.
1743, 27th June.—Battle of Dettingen.
1745.—The battle of Fontenoy, although a defeat, reflects credit on the artillery.
1746, 16th April.—Battle of Culloden, where the guns largely contributed to the victory.
1747.—Battle of Val. Capture of Bergen-op-Zoom.
1759, 1st August.—Battle of Minden, where the British artillery particularly distinguished itself by its mobility.
1760, 31st July.—Battle of Warbourg.
1779–83.—Great siege of Gibraltar, which lasted for three years, seven months and twelve days.
1781–82.—Defence and loss of Port Mahon.
1793, 8th May.—Action at St. Amand. Siege and capture of Valenciennes.
1793, 18th August.—Action at Lincelles.
1794, 17th April.—Assault and capture of Vaux, when No. 1 Company, 4th Battalion, much distinguished itself.
1794, 26th April.—Action at Troisvilles during siege of Landrecies.
1794, 22nd May.—In the action on this day the artillery particularly attracted the attention of the Commander-in-Chief (Duke of York) and were thanked by him in general orders.
1799.—Expedition to the Helder.
1799, 2nd October.—Battle of Egmont-op-Zee.
1807, August to October.—Expedition to Copenhagen (the artillery very flatteringly referred to in the despatches of Sir Arthur Wellesley and Lord Carthcart).

The commanding officer, Sir Thomas Blomfield, was created Baronet for his services on this occasion.

1808, 21st August.—Battle of Vimiera.

1809.—Walcheren expedition. Capture of Flushing (17 troops and companies of the R.A. took part in this expedition under the command of Brigadier-General Macleod, the then D.-A.-G., R.A. Lord Chatham, the commander of the expedition, wrote in his despatches: "It is IMPOSSIBLE for me to do sufficient justice to the distinguished conduct of the officers and men of the Royal Artillery, under the able direction and animating example of Brigadier-General Macleod").

1809, 11th May.—Passage of the Douro.

1890, 28th July.—Battle of Talavera.

1810, 27th September.—Battle of Busaco (the use of shrapnel is stated to have been very effective at this battle.

1811, 5th March.—Battle of Barossa.

1811, 5th May.—Battle of Fuentes d'Onor.

1811, 22nd May.—Battle of Albuera.

1812.—Second siege and capture of Badajos.

1812.—Siege and capture of Ciudad Rodrigo.

1812, 22nd July.—Battle of Salamanca.

1813, 21st June.—Battle of Vittoria.

1813, 18th September.—Battle of Leipsic, where the Rocket Troop (the 2nd) greatly distinguished itself, its commanding officer, Captain Bogue, being killed. It was the only British artillery present at this "battle of nations," and called forth the admiration of the foreign Generals present.

1813.—Siege and capture of San Sebastian.

1813, 10th November.—Battle of La Nivelle.

1814, 27th February.—Battle of Orthez.

1814, 10th April.—Battle of Toulouse.

1815, 16th June.—Battle of Quatre Bras.

1815, 17th June.—Retreat from Quatre Bras, described by Lord Anglesey as "the prettiest field day of cavalry and Horse Artillery I ever saw in my life."

1815, 18th June.—Battle of Waterloo.

1854, 25th September.—Battle of the Alma.

1854, 25th October.—Battle of Balaclava.

1854, 5th November.—Battle of Inkermann.

1854–5.—Siege and capture of Sevastopol.

1855, 16th August.—Battle of the Tchernaya.

SPAIN &

1586-1588.—Drake "singed the

1589.—Corunna taken by Norr

1589.—Norris and Essex marc
gates of Lisbon. "

1589.—Sack of Vigo.

1596.—Howard, Raleigh, Es
Clifford's brilliant e

1625.—Cecil's failure at Cadiz.

1702.—Bellasys and O'Hara's

1702.—Rooke and Ormond at V

1704.—Capture of Gibraltar

Sketch Map OF SPAIN & PORTUGAL.

SPAIN & PORTUGAL.

1586-1588.—Drake "singed the Spanish king's beard."

1589.—Corunna taken by Norris.

1589.—Norris and Essex marched from Lourinham to the gates of Lisbon. "Journey of Portugal."

1589.—Sack of Vigo.

1596.—Howard, Raleigh, Essex, De Vere, Carew and Clifford's brilliant expedition against Cadiz.

1625.—Cecil's failure at Cadiz.

1702.—Bellasys and O'Hara's raid.

1702.—Rooke and Ormond at Vigo.

1704.—Capture of Gibraltar.

1705.—Peterborough's campaign; Barcelona taken by stratagem.

1706.—British in Madrid.

1707.—Almanza, British and Portuguese defeated by Berwick.

1708.—Port Mahon in Minorca taken by Stanhope.

1709.—Desperate defence of Alicante by Richards and D'Albon.

1709.—Galway beaten at La Gudina.

1710.—Brilliant Cavalry action by Stanhope at Almenara.

1710.—Saragossa allies victorious.

1710.—Stanhope in Madrid.

1710.—Stanhope capitulated at Brihuega.

1719.—Vigo taken by Lord Cobham.

1720.—Spanish beaten at Gibraltar.

1727.—Spanish beaten at Gibraltar.

1756.—Blakeney surrendered Port Mahon.

1779-1782.—Elliot's resolute defence of Gibraltar.

1782.—Murray yielded Minorca to de Crillon.

1800.—Pulteney's assault on Ferrol

1808.—Rorica, Vimeira.

1809.—Corunna, Douro, Talavera.

1810.—Busaco, Lines of Torres Vedras.

1811.—Pursuit of Massena; Busaco, Fuentes d'onoro, Albuera.

1812.—Ciudad Rodrigo, Badajos, Salamanca, entry into Madrid, Burgos, retreat to Portugal.

1813.—Change of base to Biscayan Shore, Vitoria, Pyrenees, San Sebastian.

1813-14.—Campaigns of Murray and Bentinck on East of Spain.

1826.—British force sent to Portugal.

1833-1840.—British legion under Sir de Lacy Evans in Spain—Battles of San Sebastian, Irun, &c.

A LECTURE ON

COAST DEFENCE.

DELIVERED AT

THE ROYAL UNITED SERVICE INSTITUTION,

ON THE 9TH MARCH, 1896,

BY

CAPTAIN F. M. LOWE, R.A.

THE National Artillery Association has done me the honour to ask me, through the Secretary of the Royal Artillery Institution, to read a paper to you on the subject of Coast Artillery. It is, however, wisely stipulated that my remarks should generally lie outside the province of the Drill Book. The new edition of "Garrison Artillery Drill" is so complete, and enters in every direction so much into detail, that very little is left of the subject which is not dealt with in that manual. This must be my excuse if my paper should unfortunately fail to interest you. I, therefore, come among you without maps, diagrams, and usual paraphernalia of the lecturer, and will simply make it my endeavour to-day to dispel certain illusions or misunderstandings which my experience in the School of Gunnery leads me to believe are not uncommon with regard to coast artillery.

THE USE OF COAST ARTILLERY, FORTS, AND GUNNERS.

I sometimes hear people, who ought to know better, say, "I do not believe in Coast Defence," meaning thereby, the fortifying of strategic points on the coast-line of the Empire.

I am not infrequently asked, "Of what use is the Garrison Artillery on coast fronts?" And in these days when so much is read and written about the Navy, the question is not unnatural. I hope to be able to answer it satisfactorily.

In a discussion, following upon his lecture on "Coast Defence in Relation to War," delivered before the Malta Naval and Military Society in 1893, Sir George Clarke cleverly compared the usefulness of a coast gunner to a notice that "a fierce dog was on the premises." And he considered that the coast gunner at best is but a deterrent.[1]

Admitting for the moment that this description is full and complete, it does not in the least absolve us from exerting every effort to

[1] Vide *Proceedings R A. Institution*, November, 1894.

improve our efficiency, for unless the dog is really there and is fierce, the notice board is of little value. Ideal Coast Defence consists undoubtedly in the possession of an all-powerful Navy, competent to watch, shepherd, and account for every ship in the enemy's fleet—for every ship in any combination of foreign fleets that may possibly be pitted against ours.

But, as the French Admiral Bourgois has pointed out, "The weak can sometimes foil the watchfulness and precautions of the strong, and appear unexpectedly on an enemy's coast, and there do much mischief. It is this consideration which makes Coast Defence a necessity."[1]

Recent examples are forthcoming to teach the same lessons that Naval History invariably contains. The defeat of the Chinese by the Japanese points to the influence of sea-power on the destiny of nations. Again, the sequel to Admiral Mello's useless destruction of life and property on the coasts of Brazil in 1893 and 1894 shows what must be the eventual fate of a navy, however strong, that does not rest upon safe bases.

Admiral Mello, it will be remembered, had the greatest difficulty in obtaining supplies, carrying out refits, and giving his crews necessary rest during the protracted struggle. But one fort in Rio Harbour supported his cause, which was, as may be supposed, upon an island, and therefore, for purposes of supply and repair, little better than a large ship.

Ashore Marshal Peixoto's forts and garrison gunners served their purposes, although they appear to have been indifferently armed and provided with any ammunition that could be got hold of.

Marshal Peixoto gained time to get together a fleet, and, although this fleet was an incongruous collection of vessels manned by scratch crews, its appearance off Rio, backed up by the forts, practically put an end to the civil war.

This, then, is the true function of our coast fortresses—to hold the strategic bases of the Navy, if attacked, until naval relief is forthcoming; and, in the words of an experienced naval officer, Captain Martin Leake, written in 1728, concerning the Portsmouth forts, "Secure our Navy and a good harbour."[2] And this duty will have to be carried out, not only for the Royal Navy, but for the Mercantile Marine. To the Navy belongs the duty of keeping open the highways of the ocean to the vast trade of the Empire, valued in a recent Parliamentary return at over 954 millions a year.[3] To the Army, with the coast artillery as the pre-eminent arm, belongs the duty of securing the shore ends of the great trade routes. Sea-borne trade is the life-blood of the Empire, and its circulation must be maintained, or collapse and demise will result. The United Kingdom must be supplied with food from across the seas. Even if a sufficient store of food is kept up in England for any definite period, the people must be able to earn wages wherewith to purchase it; and to enable them to

[1] "Les Torpilleurs, la Guerre Navale et la Defense des Côtes," p. 215.
[2] "Life of Captain Stephen Martin," Navy Records Society, p. 213.
[3] Navy (Sea-going Warships, etc.), d. Admiralty, 3rd September, 1895.

earn wages raw material must be imported without great difficulty, and the manufactured article exported with equal ease.

Besides the duty of fighting the heavy guns in coast forts, there are other ways in which the garrison gunner will find employment. In times of war, orders and regulations for the management of the traffic of shipping entering fortified ports will be framed to meet the requirements of the war in which we may be engaged.

The duty of enforcing these regulations will fall upon the Garrison Artillery. It will be an arduous and irksome duty, and inglorious, if duty may ever be so qualified. It is a duty that must be provided for and cheerfully performed. The most important detail in the Garrison Artilleryman's work in war will be to look out for and repulse torpedo-boat attacks. There is little or no war experience to show how far forts will be able to deal with this comparatively new form of raid. The experience gained at Wei-hai-wai is, as far as it goes, in favour of the fort *versus* torpedo boat, but it is not enough on which to base opinion, for until the forts commanding the entrance to the harbour of Wei-hai-wai were in the hands of the Japanese Army, and presumably also the shore search lights and mine fields, Admiral Ito would not venture a torpedo-boat attack. And it is interesting to note that the Japanese in the forts completely frustrated the torpedo-boat attack on the night of the 30th January by opening fire on their own boats from the forts, mistaking them for Chinese. Surprise being an essential element in such an undertaking, the mere betrayal of the presence of the attacking flotilla was sufficient to send it back to the fleet. Discretion proved in this case the better part of valour, though no one can say that the crews of the Japanese torpedo boats were wanting in the latter virtue. It is in the direction of repelling such raids that the principal training of Garrison Artillery must eventually tend. More than ever will it be necessary for smart drill and quick laying, and this not only in daylight, but at night. The men, to repel a torpedo-boat raid, must obtain what Nelson defined as "trained dexterity, acquired by the mere habit of doing things in the dark and under difficulties." The laws which govern torpedo-boat attacks will be probably not unlike the conditions that attended successful cutting-out expeditions by the boats of the fleet in former wars. The details will be changed, but the principles will probably remain unaltered. Naval history relating to such expeditions will, therefore, help us to realize what our duties in this respect will be.

The guarding of booms and of mine fields, where they may be found necessary, will also fall to the lot of the Garrison Artillery; but here infantry would probably assist, and be of great service. Therefore, in every way in which our Navy, our Merchant Fleet, and a good harbour may be secured the Garrison Artilleryman comes to the fore. He appears to me to be more than a watch-dog, and if similes are convenient and desirable, I would rather liken him to the goal-keeper in the football field, whose duties need no explanation to an Englishman. I would, however, be quite clear on this point—no amount of coast artillery will ever afford a substitute for a single man-of-war.

The true estimate of the relative value of ships and forts is strikingly and aptly illustrated by the action of the Earl of Sussex, who was Warden of Portsmouth at the time of the threatened invasion by Spain. To quote his own words in writing to Walsingham, July 26, 1588: "I have sent enclosed a letter from my Lord Admiral, which I received at six of the clock this morning, wherein he writeth for powder and shot, and saith he hath very great want thereof, by reason of three great fights which he hath had with the Spanish Fleet. Whereupon I have sent him so much as that I have altogether unfurnished myself, which I shall desire your Honour to be a means that it may be supplied, for that I shall have great want thereof if any attempt be offered."[1] At six in the morning he heard the fleet was short of ammunition; he immediately cleared out his magazines, and sent all his powder and shot away to the ships, leaving Portsmouth defenceless, and then wrote to London for fresh supplies, not only for himself, but as a further reserve for the fleet. He finished his letter by hoping that when writing again he might be able to send "some certain news of good success," thereby showing that possibility of invasion was still before the country when he stripped the defences of Portsmouth to supply the fleet. Again, if fortifications afford a sense of security to a nation (the Royal Commission of 1859–63 is a case in point), and if public opinion is prevented by the existence of forts from interfering with the direction of the movements of the fleet, then forts and gunners will indirectly prove of still further value to a maritime Empire such as ours.

Possibly, had the coasts of England in Queen Elizabeth's reign been comparatively as strongly fortified as they now are, Lord Howard of Effingham would not have been kept in the Channel against his will, and the Spanish Armada would probably never have seen the English coast. He wrote on June 14, 1588: "The opinion of Sir Francis Drake, Mr. Hawkyns, Mr. Frobisher, and others that be men of greatest judgment and experience, as also my own concurring with them in the same, is that the surest way to meet with the Spanish Fleet is upon their own coast, or in any harbour of their own, and there to defeat them." Again he wrote: "The seas are broad, but if we had been on their coasts they durst not have put off to us on their backs." But he adds, "I must and will obey, and am glad there be such there as are able to judge what is fitter for us to do than we here."[1]

The same idea is contained in Captain Mahan's "Influence of Sea Power on History." "There is a view of defence," he says, "which asserts that safety for one's self—the real object of defensive preparation—is best secured by attacking the enemy. England defended her own coasts and colonies by stationing her fleets off the French ports to fight the French Fleet if it came out." Let us hope that existing forts may have this effect, and that public opinion will not again court disaster by localizing fleets.

There appears to me to be another possible use for the Garrison

[1] "Defeat of the Spanish Armada," Navy Records Society.

Artillery, one for which I hope necessity may never arise. It is a use that does not constitute a reason for the existence of the coast gunner, but it may well be reckoned in estimating his worth. Should the fleet ever be short of men to man the guns afloat, would not the Garrison Artillery form a useful reserve of disciplined and drilled men from which to draw? There will be no press-gang in the future. If the fleet is not properly manned, there is no use in keeping men in forts who might be of service afloat. As facts of the past help us to forecast the possibilities of the future, a few instances, taken at random, of the part that has been played by artillerymen afloat, will not be out of place. Before, and for some time after, the days of Queen Elizabeth the gunners afloat and ashore were under the control of the Master-General of the Ordnance, and were apparently borne on the same lists. There is extant a curious letter from Master-Gunner William Thomas, of the Garrison of Flushing, written soon after the defeat of the Spanish Armada, which points to the fact that the principal man behind the gun was the same afloat and ashore. In this letter it is urged that if the petition of the gunners had been granted in former years, and if they were established on a firmer basis, as in the reign of Henry VIII., there would have been less "blind exercise and unskilful teaching," and the gunners would have shot straighter than they did at the Spanish ships. "So much powder," he writes, "and shot spent, and so long time in fight, and, in comparison thereof, so little harm."[1] It is not in human nature that Master-Gunner Thomas, a garrison gunner, would thus excuse the bad shooting of gunners afloat unless he and they were of the same corps. In latter days, and well into the beginning of the present century, Royal Artillery served afloat in the bomb vessels. Admiral Boscawen, in the East Indies, thought so much of his Royal Artillerymen that he wished to have the promotion of the officers in his own hands.[2] Lieut. Thomas Davies, of the artillery, in one of the vast inland seas of North America, actually commanded a naval force at the time of the conquest of Canada.[3] It is recorded that he took a French frigate of eighteen guns after a close action of nearly three hours. Sir Thomas Blomfield, of Copenhagen fame, as a Royal Artillery officer served under Rodney at the bombardment of Havre in 1759.[3] His experience afloat served him in good stead afterwards in fitting out floating batteries on the Canadian lakes.

Lieut. Robertson, R.A., with some gunners, served under Nelson on board the *Victory* in 1805, but was not fortunate enough to be at Trafalgar.[2] Similar instances could be quoted without end. There is nothing new in the idea of Royal Artillery serving afloat, and it is worthy of note that such service was popular with gunners.

I have no real difference of opinion with Sir George Clarke on the subject of coast artillery; it would indeed be presumptuous if I had. I only think that he does not give the coast gunner sufficient credit. Professional zeal prompts me, for reasons I have given, to consider that

[1] "Defeat of the Spanish Armada," Navy Records Society.
[2] Duncan, "History of the Royal Regiment of Artillery."
[3] Kane's List.

the functions of Garrison Artillery in war is something more than "deterrent." Having regard to the change in Continental Armies since the days of Waterloo, and to the conditions upon which rest the safety and existence of the Empire, I hold that our Army does not contain a service of greater importance than the coast artillery.

Coast Forts should be manned by the Army, and not by the Navy.

Now as to the manning of forts, there is a widespread and curious theory that admits the usefulness of coast forts, but considers that they should be evacuated by the Garrison Artillery, and handed over to the Navy and manned by sailors. If this were to happen, the actual working of the forts would no doubt be well done, as sailors' work invariably is, but this is not the only point to consider. When a naval base is attacked history shows us that, with few exceptions, the serious attack is directed on the land front. This attack may or may not be supported by a bombardment of the forts on the sea-front. A field force must be ready to render the assault abortive, either by direct conflict or by threatening the rear and communications of the attacking force; and if the attack is pressed home, the land fortifications should be able to hold out until relief is brought. Now, unless the advocates of sailors in coast forts are prepared to hand over, together with the coast forts, the land forts and field force of the fortress to the command of the Port Admiral, there will be a dividing line of authority inside the fortress, somewhere between its sea and land front. The fortress will be cut in half; surely neither one nor the other alternative is desirable. No, the function of the fleet is clear. Its *locus operandi* is on the sea. The function of the Army is equally as distinct, and its duties are ashore. Nature has provided a boundary fence between them; it is called the five-fathom line. Here and there, there may be—there must be—some overlapping to make the joint good. Where such is the case let the naval voice, by all means, in a naval nation be supreme. Captain Mahan, of the United States Navy, has once and for all laid down a definition difficult to disprove. He points out, in his "Influence of Sea Power on History," that there is "much unnecessary wrangling as to the proper sphere of the Army and Navy in Coast Defence. Passive defences belong to the Army, everything that moves in the water to the Navy;" and in a previous paragraph he defines passive defences as "fortifications, submarine mines, and generally all permanent works destined simply to stop an enemy if he tries to enter a harbour."

"If seamen," he continues, "are used to garrison forts, they become part of the land forces, as surely as troops, when embarked as part of the complement, become part of the sea forces."

There is an expression in common use with regard to the sea and land forces of which we have recently heard frequent mention. I allude to what is called the first and second line of defence. It has always appeared to me that this term is not only inaccurate but misleading, and therefore wholly undesirable. If my judgment is

correct, then, for National Defence, and for all purposes where joint action is necessary, the Navy and Army are as one. They stand or fall together. It is only necessary to remember that their individual duties are different.

Since I wrote the above I am pleased to find the same idea has been expressed by an abler voice than mine.[1] But in this connection let me beseech you not to think or do or say anything that may tend to create or foster a spirit of jealous rivalry between the two services. There is no tug of war between the Navy and the Army; we are both on the same side of the rope. You who are so skilled at shifting ordnance know the value of the word of command, "Taut, together heave," and in any apparent difference in naval and military opinion remember we must all "heave together."

Garrison Artillery Drill is not Unnecessarily Complicated.

It is frequently said that coast artillery drill is too complicated. Those who, for the first time, take up the subject of coast artillery are often unnecessarily alarmed by the various figures and formulæ that confront them. Objections are raised to the following effect: That to comprehend the various calculations a man must be an advanced mathematician, and that, even when able to grapple with complicated sums and tables, he could not be expected to do so in the heat of action. In short, the complete coast artilleryman is often, by a process of unnecessary exaggeration, likened to a creature such as Shakespeare must have had in his mind when he wrote, "A braggart, a rogue, a villain that fights by the book of arithmetic."[2] No one expects sums to be worked out in action. The object of all you read in your Drill Book is in order to accustom and train your mind at drill, and at peace practice to what time of flight and a moving target really mean. Thus when the day of action comes you will instinctively know what is required to be done in order that your projectile and target may meet.

It is wonderful how soon our range-finding specialists acquire the power of accurately estimating the speed of a ship from constant practice in measuring it. Similarly, coast artillery officers, and especially those who will have to act as battery commanders, should, by constant practice and application of the rules and tables furnished to assist them, be able instinctively to arrive at accurate data for successful shooting.

Tables and formulæ are poor substitutes for the experience of much practice, but until we get a larger allowance of ammunition to fire, and even if that allowance could be made sufficient to our wants, they are of undoubted assistance, and should be carefully used accordingly.

The reason for the apparent complication in fire discipline of coast artillery is that for service practice we have abolished standing targets, sighting shots, and signalling errors by a range party, as useless in

[1] Admiral Colomb.
[2] *Romeo and Juliet*, Act III. Sc. 1.

preparation for war under modern conditions. The standing target has done its work, but the time has come to put it away with the bows and arrows with which it had its origin. All our efforts are directed towards obtaining faster and still faster targets.

We read that at Wei-hai-wai the Chinese gunners in the forts, at ranges of 2400 yards, were unable to hit the Japanese vessels moving at a high rate of speed. It is a lesson for us all that we should do well to lay to heart. The difficulties of making good practice at a really fast-moving target have not, I fear, been thoroughly appreciated. Let us hope that when we first realize these difficulties it may be at peace practice, and then only to overcome them. Every device that may possibly assist us in this direction should be welcomed and used, especially those contrivances whose action is automatic.

In cases such as that instanced by Wei-hai-wai, ranging, as we know it, is out of the question. A ship crosses the sector of fire so rapidly under service conditions, that if we could get off two salvoes at the same craft we should be lucky. Abroad this has been recognized, and means are provided to enable a battery commander to estimate with fairy accuracy how many salvoes he would be able to get off at the same target as she crosses his sector of fire. If it comes out a doubtful two, he keeps his fire until the ship arrives at the shortest range, where the effect of his one salvo will be most likely to be accurate and effective.

We want quick-firing, high-velocity guns of medium and small calibre, fitted with automatic sights where possible, and in all cases the sights should be so arranged that the gun-layer is clear of the loading numbers and recoil, and can follow his target during the operation of loading.

(The best material is, however, of little use unless the personnel is perfectly trained in its minutest detail.) We further want a good B.L. howitzer of nine or ten inch calibre for high-angle fire; we want faster targets and smarter drill.

Everything in these days tends to pace. Of late we have read quotations from *King John* that are no doubt very apt and desirable in that they are patriotic.[1] If, however, we must quote from that play, let us say with "Philip," "The spirit of the time shall teach me speed."

It cannot be insisted upon too much that the difficulties in solving the problem of good practice at fast targets are very great—greater, perhaps, than many have imagined who have given the subject thought. Where difficulties are great the means to overcome them are not usually simple. We must face the difficulties, and by constant drill and practice become familiar with the various rules and methods that the Drill Book gives. To do this it is not necessary to be a mathematician, as some aver. Coast artillery fire discipline is now, owing to these conditions, an art that cannot be taken up one day and dropped the next. It is a special study.

On the other hand, there is no doubt a tendency, observable in all

[1] Vide *Punch*.

undertakings, of clever men to elaborate. In their great zeal they are apt, in perfecting the means, to forget the end, or rather, perhaps, to mistake one for the other.

The framers of our Coast Artillery Drill have not escaped the charge of complicated methods. Those who lightly bring this charge cannot have realized the difficulties to be dealt with. It is noticeable, too, that they rarely suggest a satisfactory and simple substitute for that with which they find fault. Let me assure you the authors of the Drill Book have made it an object to simplify drill in all its details, and to make every accessory appliance as automatic as ingenuity can devise or experience suggest. Here we should bear in mind that in our many and inconsequent units lies an inevitable hindrance in the way of simplicity. We have to deal with inches, feet, and yards, and in addition the deflection leaf has two quite unnecessary units—degrees and minutes. Between them all it is not to be wondered at that difficulty sometimes arises; and we can well congratulate our Continental neighbours who use the metre and its decimals for all purposes of linear measurement.

Once more to revert to the lesson of Wei-hai-wai. We are told that "the state of the garrisons (of the forts) was indeed hopeless, for the men had no drill beyond the mere loading and firing of their big guns. They had no night exercises, nor instruction in any kind of night signals, and were entirely ignorant of any kind of emergency duty; in short, neither officers nor men had an idea beyond the working of their guns."[1] If we are to be of use, if we are to be truly "efficient," we must do better than the Chinese coast artillerymen.

High *v.* Low Sites for mounting Guns.

As to the advantages of mounting guns on elevated positions, Sir George Clarke, in his valuable work on "Fortification," says: "It is always desirable to mount guns upon high sites when possible. The teaching of the Wasp and Telegraph Batteries at Sebastopol was sufficiently clear, but, on account of some strange misunderstanding of ballistic laws, this teaching is only now beginning to bear fruit." I fear the harvest from this tree is not at present bounteous. I find on all sides the strange misunderstanding of ballistic laws only too prevalent. As the question of value of height is but little referred to in the Drill Book, I will endeavour to point out to you in detail some of the advantages it offers.

General Richardson has admirably summed up the value of a high site in one short sentence: "On heights less protection is needed, the guns cannot so easily be rushed by landing parties, their practice is better, their target is always larger, while they are difficult objects for a ship to hit."[2] Colonel Jocelyn[3] has proved General Richardson's statements analytically for us. In spite of history and the efforts of

[1] *Blackwood*, November, 1895.
[2] *Proceedings Royal Artillery Institution*, No. 1, Vol. 20.
[3] *Proceedings Royal Artillery Institution*, No. 4, Vol. 20.

those distinguished officers whose names I have quoted, it is not easy to make some otherwise good gunners believe in these important truths. This year the Garrison Artillery stationed at the principal coast fortresses will compete in their prize firing for a cup that has been generously given for the purpose by our Deputy Adjutant-General, who occupies the chair this evening. (Cheers.)

Naturally, every endeavour will be made to secure the best advantage in this competition.[1] I fear that a general scuttle downhill will result, and with the best intentions the guns nearest to the level of the sea will be used where possible for the competition. The argument used in favour of low sites is, I believe, the following: It is admitted that when you have a ship for a target, then the high site has the advantage, because beam is greater than freeboard, and as you ascend the target becomes larger. With practice targets that are freeboard, without beam, the case is reversed, and the low site presents undoubted advantages. I shall endeavour to prove to you that the low site does not possess this advantage claimed for it.

To return to the advantages of a high site, there is the advantage of look-out. On p. 488 of the new "Garrison Artillery Drill" you will find it stated that ships coming in at 14 knots will be within range in less than half an hour after their having been first sighted. This means that the ships were not sighted until they were within about eight or nine miles of the coast, and consequently the supposition is that the fire commander's station is on a low site. Let me recommend you to note in the margin of your books that water-line in miles $= \sqrt{\frac{3}{2}} \times$ altitude in feet. That is to say, the water-line of a ship can be seen so many miles distant from the eye of the observer when he is so many feet above sea-level. Smoke from a squadron under way would be noticed long before the water-line of the leading ship could be seen. Off the mouth of the Yalu the Chinese saw the smoke of the Japanese fleet an hour and a half before the Japanese made out the Chinese.

From the top of a cliff 600 feet high the water-line of a vessel is observable up to 30 miles, and smoke, say, 10 miles further still. This may be, and is, an extreme case, and means clear weather and a good glass. But it is worth considering in connection with the Drill Book statement. In the case of an observing-station 600 feet high, you get over two hours' notice in place of the Drill Book's "less than half an hour," always supposing the same conditions and 14 knots speed. "Less protection is needed on a height." The flatter the trajectory of a gun the less will be the angle of arrival, and with modern guns at short ranges the angle of arrival of projectiles on the parapet of a high site fort will in many cases be one of ascent. Little or no harm to the fort will result. At the passage of the forts of Vicksburg and of Port Hudson, on the Mississippi, the moderate height of about 100 feet was sufficient protection for the guns, while the low-site water batteries

[1] The company which eventually carried off the Deputy Adjutant-General's cup fired from a site 160 feet above sea-level.

suffered severely. High sites compel ships to fire at long ranges if they want to do harm, and then inaccurate fire is likely to result; and remember that as the muzzle velocity of modern guns increases, and the trajectories of modern projectiles become flatter, so does the protection afforded by a high site become greater.

"The high-site battery is not so liable to be rushed by landing parties." The fate of the inner defences of Vera Cruz, captured by seamen of the French Fleet in 1838, is an example of the danger to which a low site work is exposed in darkness and fog. It is obvious that height renders the success of such an exploit less feasible. On a smaller scale may be instanced the unsuccessful attack on the French forts in the island of St. Martin in 1808. The landing party obtained possession of the low-site fort and spiked the guns, but were unable to reach the high-site forts, and so the attempt failed. The corollary to this is that the high site fort may be of cheaper construction than that at the water's edge.

At the close of the French Naval Manœuvres in the Mediterranean in 1893, the fleet carried out some interesting experiments in firing at a high site.

The target was on the top of Cape Rosso, on the west of Corsica, probably one of the ruined Genoese towers so common on that coast. Six battleships opened fire, while one was told off to observe its effects.

The range was first 8750 yards, and speed 10 knots; the guns were 6·3 inch and 5·5 inch. The range was afterwards reduced to 3800 yards, and guns of all calibres were used, and the speed maintained at eight knots.

Three of the ships subsequently went back to the first range, steaming a course on the arc of a circle of which the target was the centre. The results are reported to have been not very satisfactory from the ship's point of view. This experiment affords another instance of the value of a high site, and is supplementary to our own experiences at Inchkeith and Portland, that tell the same story, but with older ordnance.

The principal lesson to be derived from the Inchkeith experiments is, that it took over 15,000 rounds of machine-gun fire to score 15 hits on dummies representing a gun detachment in unnecessarily exposed positions. The conditions were most favourable for the ship in every respect except that the target was on a high site.

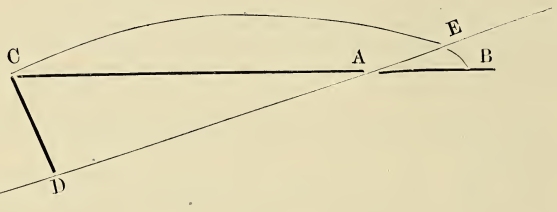
"The target is always larger from a high site." This, I think, will not be disputed. As we ascend a ship looks larger to the eye, and a moment's consideration will show you that from a height the target offered to the projectile as it approaches it, is still larger than it is to the eye.

The remaining advantage claimed for a high-site battery by General Richardson is that the "practice from it is better." The fact in itself constitutes protection. Again, to quote Captain Mahan: "In the struggle to multiply gun shields and other defensive contrivances . . . there is now a tendency to undervalue . . . a leading principle

in warfare. The best protection against the enemy's fire is a well-directed fire from our own guns." [1]

Let us now consider how height affects practice against a target such as we use, that has only length and freeboard, and is without the third dimension of beam. Lateral errors do not concern us in this investigation, as height does not affect direction.

Throughout your Drill Book you will find enumerated the various disturbing causes that affect the range. It does not particularly matter what the cause of error in range may be, but suppose our target is at A, we are firing from C, a low site, and for some reason the shot strikes



at B, an error of AB. Now assuming the theory of rigid trajectory, which is practically true for small angles, let us suppose C on a height, and the round is repeated under exactly the same conditions; DA being now horizontal, the shot will strike at E, an error equal to AE, or less than that when firing from a low site. To take an actual example—8 oz. of powder added to the full charge of the 9-inch R.M.L. gun will increase its muzzle velocity about 8 feet per second (and I fear that variation from correct weight is not so uncommon as it should be). This increase of velocity on the flat means an increase of range of 30 yards in 1700. At a height of 250 feet above the level of the sea this error is reduced to 20 yards—a very considerable reduction. For the sake of argument, let us suppose that we have perfect guns and ammunition, and accurate range-finding arrangements, and that the guns shoot exactly in accordance with the range table. Now, suppose one gun is in a fort 250 feet, and the other at a height of 29 feet above the mean level of the sea. These heights have been taken because they represent the heights of forts actually in existence, that need not be named. It is manifest, under the conditions, that when the gun is fired we hit or miss the target according to whether the gun is inclined at the correct angle or not to the horizon, the line being supposed to be correct. Further, there is a limiting angle of elevation between that necessary to strike the water-line and that to just graze the top of the target. Our targets are 12 feet high, so with the 9-inch guns this limit, which may be called the "permissible error in elevation," is a very appreciable quantity. If you take the trouble to make out a

[1] "Life of Farragut," p. 218.

table of quadrant elevation for the high site and for the low site, reading to minutes and yards, and also make out a table of permissible errors in range for the high and low site, you will find that, although the actual permissible error in range from the high site is less than from the low, the permissible error in elevation, the cause over which we in the fort have control, is the same in both cases. That is to say, for a 9-inch gun firing at 1700 yards, the permissible error in elevation is eight minutes from either site, when firing at a target such as we have supposed; but the permissible error in range is, for the 250 feet site, 39 yards, and for the 29 feet site it is as much as 65 yards; or, in other words, you can make a mistake of eight minutes on the 250 feet site, and only get an error of 39 yards, whereas the same error on the 29 feet site gives an error of 65 yards, getting on for double the former amount. This is where the fallacy has crept in—the effect has been considered without giving due consideration to the cause.

The true comparison to make is, how far will the same error in elevation affect the same gun on a high and a low site? You will find practically no difference as regards the target without beam, but as the scale by which the elevation is given is more open, and therefore easier to read the higher you ascend, the chances are greater that the correct elevation is given to the gun on the high site.

This will show you that the range tables issued for each gun only furnish (as far as six columns out of thirteen are concerned) the necessary data for you to reconstruct range tables suitable for the particular height at which your gun is mounted. Remember that the range tables are made out for target and gun on the same level, and that directly you fire at a target lower than your gun, then much of the data given in the tables requires modification. Take the 9-inch gun as an example. The range table tells you that on the flat five minutes' elevation at 1700 yards makes a difference of 47 yards. Take the gun up only 100 feet, the difference is reduced to 34 yards, whilst at 250 feet the difference is 20 yards. Even 29 feet reduces the difference by 7 yards, 40 instead of 47.

Again, on page 57 of your Drill Book, you must suppose the statement to refer to a very low site indeed (which, fortunately, is the exception rather than the rule). It states: "If there is a difference of level in the racers of five minutes between trail extreme right and extreme left, this would mean, with a 9-inch or 10-inch gun, a difference of 50 yards at 1500 yards range." At a height of 250 feet the error in range caused by five minutes' irregularity of racer would be less than 16 yards in 1500.

For this reason you can easily imagine that correction of fire is easier on the high site for gunnery reasons alone. Racer and tide corrections tend to disappear, and what is called, with great unfairness to the ammunition, "the powder correction," becomes less, and proportionately the chance of error in giving it ought to be reduced. I understand that it has been necessary, when practising from some of the high-site batteries at Gibraltar, to increase the range beyond the usual limits, in order that the target may not be destroyed each

round. It is only a repetition, with modern guns, of Lieut. Koehler's experience with S.B. guns and his depressing carriage during the defence of Gibraltar in 1782. Drinkwater, the historian of that memorable defence, records that "as to the accuracy of the depressing shot, no further proof need be adduced than that out of 30 rounds 28 shots took place in one traverse of S. Carlos Battery."

It will not, I think, be questioned that observation of fire (an important factor in shooting when ranging is possible) is easier and more accurate from a height, so that advantage need not be dwelt upon, but simply scored to the credit of the high site.

The most important advantage of height is, perhaps, the help it gives us to ascertain ranges. You have, I understand, now been supplied with the depression range-finder, and are already acquainted with the very great value of the little instrument. If you take the trouble to investigate the principle of its working, and compare its working on a high and low site, your pains will be amply rewarded. Taking an average of the ranges between 1700 and 1800 yards, you will find that an error in the instrument (whether through defective adjustment or faulty manipulation) of one minute at 48 feet above sea-level makes a difference in the recorded range of about 56 yards at mean tide. Supposing a rise and fall of six feet, at high water this error would make a difference of 64½ yards, and at low water of about 50. At a height of 250 feet the tidal differences practically disappear, and the error of a minute corresponds to one in range of just less than ten yards. The advantage here of high site is enormous. When you consider the serious consequences on a low site of an error so small that the bubble of an ordinary spirit-level is only just moved by it, then you realize the advantage of a high site if for no other than from the range-finder's point of view.

In your Drill Book, on page 57, the advantage of a high site in automatically correcting small errors in range is pointed out. Abroad height is utilized to a further extent, and it is to be hoped that we may soon follow the good example. Automatic sights are provided; that is a system of sighting by means of which correct elevation is automatically given by laying on the target. Such sights are not intended to supersede range-finders, but to supplement them at shorter ranges. It is obvious that the range at which an automatic sight can be used with accuracy depends entirely on the height of the gun above sea-level. There is no reason why all guns mounted at 200 feet and over above sea-level should not make very fair practice at average ranges, say, up to 4000 yards, if fitted with automatic sights, and at the same time be independent of range-finders. Here in itself is a sufficient reason for the preference of a high site. Range-finders and their adjuncts may fail at a critical moment, and the knowledge that there is a reliable automatic sight to fall back on, should such disaster occur, will, I know, be hailed with delight by all who have had experience in the modern conditions of coast artillery fire.

Sir George Clarke has instanced the value of high sites by experience in war in the Black Sea. Without leaving the same waters, we can

learn the same lesson by preparations in peace. At Batoum the old Turkish low-site forts have been strengthened and re-armed by the Russians. But the strength of the place consists in two new forts, 300 feet above sea-level, overlooking the harbour and skilfully concealed. To obtain this height about 700 yards of range was necessarily sacrificed, but the manifest advantages more than counterbalance the minor drawback.

A slight sacrifice of range on a high site is inseparable from the conditions. In the case of quick-firing guns intended for use at night or in thick weather, every yard is of advantage to bring the gun as near as possible to its target for the purpose of being able to see it. I would, in selecting a site for a gun to be used under these conditions, choose a position as near to the channel to be defended as possible, consistent with sufficient height to enable the use of an automatic sight possible at all probable ranges. You have to balance two considerations: It is of no use mounting a gun where you cannot see your target, nor is it of use mounting it in such a position that you can see but cannot hit your target with certainty. Let me warn you against the erroneous but common idea that the trajectory of our B.L. guns may be taken as flat for 2000 yards, and that quick-firing guns should be mounted but little above sea-level for this reason; and that fire should be directed from them from 3 to 7 feet above the water-level for the purpose of repelling torpedo boats. Take the 12-pounder quick-firing gun for instance. At 2000 yards the maximum height of its trajectory may be taken roughly as 64 feet. The gun must be some feet above high-water mark to start with, so that at mean tide, at somewhere about 1000 yards, projectiles would be at least 70 feet above the water. Therefore the prospect of sweeping the area commanded by guns so mounted at the elevation for 2000 yards is not promising.

I know that low sites for quick-firing guns have been recommended by officers of great weight and authority; the importance of the question must be my excuse for respectfully opposing my opinion against theirs. Perhaps the term "flat trajectory" is partly responsible for the ideas that exist with regard to low sites. The term is misleading, and must be regarded as comparative. The French consider the point so important that their range tables contain a column giving maximum heights of trajectory for each range—a most useful aid, from a gunnery point of view, in arriving at an estimate of a gun's capabilities.

It is not, therefore, surprising to find in the Report of the School of Gunnery for 1895 that when the courses under instruction practised from a high site, accuracy in firing improved. The value of a high site, to be truly appreciated, must be experienced, and it is to me a matter of regret that the N.A.A. should invariably carry out their practice from the lowest site in England. For this reason, and for others that do not come within the scope of my lecture, I, for one, should like to see the N.A.A. changing rounds and practising at a different fortress each year, and from those guns that in time of war the volunteers would have to man.

The opportunity of visiting the dockyards, and there seeing what

ships of war look like, would form a useful portion of the instructional advantage of the annual camp. "The science and practice of artillery" would thus be not only "advanced and promoted," but the volunteers would be at the same time made familiar with their places of mobilization.

There are, no doubt, many difficulties in the way of such an arrangement as I propose. But that the principle is sound I know from experience. In 1893 it was my privilege to assist at the Meeting of the Artillery Association of the Dominion of Canada, and I can testify to the advantages of getting the auxiliary forces into the forts arranged by that valuable association then for the first time. Since 1893 the system has, I understand, been extended with still greater success.

In conclusion, I would recommend you to study your new Drill Book firstly, and after that Naval History. I read somewhere lately that English people are not a history-reading race, and that not nine people in ten know the date of the battle of Trafalgar. Any other nation but our own would probably make its anniversary a public holiday in perpetuity. So perhaps, therefore, even the study of attacks upon territories will not be a congenial pursuit to you. Nevertheless, I recommend you to take up this form of literature. Begin with Admiral Colomb's "Naval Warfare;" once started you will go on. Do not confine yourselves to English books, but endeavour by reading foreign works "to see ourselves as others see us." Many of you are members of this Institution, and can have access to its magnificent library. To those who are not members I would say: "It is never too late to mend."

One suggestion more: The Institute of Electrical Engineers is, I understand, doing a good work in registering those of their members who are willing, for the purpose of National Defence. In Australia, I believe, a corps of Electricians exists, and no doubt is most useful. It occurs to me that you must have in your ranks many valuable men who, perhaps, are not members of the Electrical Engineers' Society, and whom that Society cannot reach. If registers are kept in every corps of volunteer artillery of men who possess any description of electrical knowledge, they would be of infinite use to the service of coast artillery on mobilization. Very possibly such lists already exist. If they do not, let me beg you to give their formation your earnest attention.

Admiral Colomb and Colonel Sir George Clarke, K.C.M.G., etc., were kind enough, not only to send me the following remarks, but also to allow them to be published in the *Proceedings of the R.A. Institution*.—F. M. L.

Admiral Colomb wrote (July 10, 1896) :—

"I am pleased to find in your lecture so close an agreement with the views I have always put forward. I do not see much difference between us on any point, and I trust we have both got hold of the right end of the stick. I am particularly glad you drop on that most mischievous phrase 'the Navy is the first line of defence.' You will see that in the last paper

I read before the United Service Institution,[1] I specially attacked the phrase. I have always denounced it. The Navy and the Army, as you put it, are as one in the matter of National Defence—they stand or fall together. The Army has but to take care not to waste its money by trying to do, as it were, over again, what the Navy has already done. Its money should be used only in doing what the Navy cannot do.

"A certain amount of Coast Defence is a necessity, but it requires to be kept well within the mark; it must be understood that it works with the Navy, and not 'in the absence of the fleet,' as the phrase goes. Absence of the fleet at the moment may always be calculated on, but if all things are as they should be, its presence, as far as may be necessary to defend, may be equally calculated on."

Sir George Clarke wrote (June 10, 1896) :—

"Do not forget that I think and meant to say that 'the dog' ought to be very 'fierce,' always on the spot, and always ready with his bristles up, which he is not invariably at present. I think that it is a disadvantage to have too many dogs spread about over miles of coast. They are apt to become less fierce thereby, and certainly less ready to bite. Also, it seems to me to be still more disadvantageous to put up a number of notices, and to keep too few dogs. But you must not think I do not 'give the coast gunner sufficient credit.' I have had to do with coast gunners for about fifteen years, and I do not think any other branch of the Service has made half as much progress in this time.

"But except against torpedo-boat raids, which might be attempted against a few of our ports, I fear that the coast gunner—the British coast gunner—cannot expect in war to find any more employment at his special trade than he did in the past, and this was not much.

"The great Siege of Gibraltar is the only important instance I can recall, and here the coast gunner did his duty admirably and proved more than a match for his assailants. In spite, however, of the immense defensive advantages of the Rock in the eighteenth century, the coast gunner could not have saved it, if great naval efforts for its relief had not been successfully put forth.

"For all that, he is absolutely necessary to the British Empire. It is his misfortune that, in proportion to his known efficiency, his prospects of fighting with his own weapon diminishes; because his menace is so great, and ships—his only assailants—are now less than ever fit for a task which lies quite outside their proper *rôle*.

"There is no parity of conditions. It is the business of the coast gunner to sink, disable, or drive off the ship, and he is specially trained, equipped, and circumstanced with a view to attain this object. It is not the business of the ship to attack the coast gunner, and she is not in any way prepared for the task. To permit her to undertake it, is like employing cavalry to attack infantry behind earthworks. This has actually been done; but like the charge of the Light Cavalry Brigade at Balaclava, it certainly is not war.

"I do not, of course, forget that, as at Kinburn, craft specially constructed with a view to oppose the coast gunner, have been occasionally employed, but I do not see how our enemies can make use of such craft until our star has set, and then these measures will not be in the least necessary."

[1] The paper to which Admiral Colomb refers was published in the *Royal United Service Institution Journal* of December 1895. Every artillery officer who has not read it should do so.

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RÖNTGEN RAYS.

BY

W. WEBSTER, Esq., F.C.S.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 12th Nov.*, 1896.)

Colonel C. C. Trench, Director Artillery College, in the Chair.

Colonel Trench, Ladies and Gentlemen—I start with a considerable amount of diffidence in approaching a subject of this description, because there has been so much written in the public press for and against it, that it is difficult to tell you anything new; in fact, there is nothing new to tell, as the process is merely an evolution of a series of discoveries made by eminent men.

We owe to Electricity some of the greatest benefits mankind has ever enjoyed: Telegraphy, Telephonic Communication, Lighting, etc; also in Surgery, electric Cautery and Electrolysis; and it now seems that still greater benefits are to be received in this direction by means of the Röntgen or X Rays.

We start in ignorance, for although electricity can be explained in a highly mathematical manner, it is by no means satisfactory; the explanation usually given, in a popular form, is that there exists a subtle fluid which acts by repulsion on its own particles and pervades all matter. By friction certain bodies acquire an additional quantity, and are said to be positively electrified; others by friction lose a portion, and are said to be negatively electrified; the two, when combined, neutralise one another, and are then supposed to be in the natural state generally called "Static."

Electricities of the same name repel one another, and electricities of opposite kinds attract one another; but beyond the fact that we know the properties of this mysterious Ether or Fluid and can use it for Heat, Light, Chemical Action or Power, we are absolutely ignorant of what it is—we are dealing with an unknown quantity.

It is very difficult to say what anything is! For if you take up a metal, I do not care what—say, lead—you can explain all its properties, you can say that it is called Lead, that there are Oxides, Sulphates, and Chlorides, and so forth, you can describe all its reactions, that it melts at a certain temperature, and so on, but you do not know what it is; it is an element, and you cannot split up that element. And so it is with Electricity, our knowledge is only finite.

Therefore with Electricity we start with the unknown, and of course, this being so, it is not at all astonishing that we do not know the composition of the X or Röntgen Rays, X being the unknown quantity; and I am afraid they will be called X Rays for a very long time to come.

Now, for the purposes of this particular application of the electric current for the production of these Rays, the apparatus required consists of :—First of all, what are called accumulators.

Most of you know what accumulators are; they are generally known as secondary batteries, and consist of a series of plates made of oxide of lead and lead, immersed in dilute sulphuric acid contained in cells or jars, which are said to be charged with electricity; they are not actually so charged, but a chemical action takes place by means of the electric currents which, conducted by leads from a dynamo to the cells of plates, change the oxide of the plates and simply leave them in a different chemical condition; then by coupling up the cells of those plates in series with wires attached to terminals a reverse chemical action is obtained on completing the circuit, which produces the force named Electricity. In fact there is very little difference between a secondary and a primary battery, *i.e.*, one in which you burn or dissolve metals by means of acid. It does not matter what you do to produce Electricity for Force, Light or Heat, you must have chemical action. So much for the secondary batteries, the best of which are by no means satisfactory.

Then we have what is known as the Induction Coil, on which I am not lecturing, and will therefore content myself by saying that the specimen on the table is made by Mr. Apps, and is absolutely certain in its action; the primary coil is of thick insulated wire wrapped round the core, and a secondary insulated coil of thin wire at least 10 miles long wrapped round the insulator of the primary; the make and break to produce interrupted current is admirable in its action, having a pull adjuster; at the base are the accumulators of tin-foil. The Coil gives a 10-inch spark with a current of 10 amperes and an E.M.F. of 8 to 10 volts—supplied from the secondary batteries—the 10-inch spark is supposed to represent 70,000 volt E.M.F.; on this point I am by no means certain, as it is too high a voltage to measure, and unless I pulled the Coil to pieces it would be impossible to estimate it theoretically.

The history of the discovery of this particular application of Electricity, to produce so-called X Rays, is one of evolution; for in the Royal Society's "Transactions and Proceedings," for the last forty years there are communications from Gassiot, Plücker, Andrews and Tait, Robinson, Cromwell Varley, De la Rue and Muller, Spottiswoode and Moulton, Grove, Crookes, Schuster, J. J. Thomson, and Fleming; to these may be added Hittorf, Lenyard and Tesla, Hertz, Lennard, and finally Röntgen; and the real inventor of the improved Tube that we now use—and get so much benefit from—Mr. Jackson, of King's College.

As you see, this is the work of Englishmen *and* foreigners; but there are many Englishmen connected with the evolution of this discovery,

and Professor Röntgen has practically "topped," in the popular phrase, the other people's work by the final touch—"success."

Varley, in 1871 (he is dead and gone), knew that the cathode discharge formed shadows of interposed bodies; if he had only placed a photographic plate under the interposed bodies he would have produced chemical action on the film—it was this that Professor Röntgen did.

Professor Crookes's work in the direction of high vacuum phenomena and the invention of his tube, undoubtedly made the road easier for the ultimate success attained; but we are indebted to Mr. Jackson, of King's College, for the focus tube, the best being manufactured in this country by Messrs. Newton, without which it would be impossible to have obtained the results of its successful and practical application.

The Jackson tube, I am informed, was first made in 1894, and Röntgen's discovery was announced in January of this year (1896), so you see the tube was in advance of the final work. I hope it is not invidious to say that it is highly gratifying to find that something not "made in Germany" is a success. (Loud applause).

The discoveries made abroad during the last few months, of which one reads in the various papers, are merely repetitions of what has been done very largely at home—the quiet work of English scientists.

Of course, in Germany, I am bound to say that the populace are in advance of us in knowledge, because help is given by their government, and we hear of many laboratories to which students can go free of charge for their scientific education; whereas, in this country, you must pay very heavily.

Captain Abney utilised what are known as the ultra-red, or heat rays of spectrum, which, you know, do not affect a photographic plate in the ordinary manner, and he was able to focus these rays and to photograph in a dark room a kettle of boiling water; absolute proof of the extraordinary properties of rays that we cannot see. As Sam Weller said: "My wision's limited, I can't see through a flight of stairs and a deal door." But I am not so certain that some day we shall not be able to see some very queer things in that way; that is to say we shall be able probably to see through materials which at the present time are impervious to light, but which I believe will ultimately prove to be just as transparent as glass; in fact, I am told that one worker has been able to obtain a photograph through a foot of steel; I have not seen the photograph, but I have no doubt that there is some truth in it.

I will now show you the difference between a current in a vacuum and a current in the ordinary pressure of the atmosphere. (The lecturer experimented in the dark, showing the Electric Egg.) First, you see a discharge in air; now in a partial vacuum, the character of the discharge being entirely altered. This is known as the Electric Egg—the phosphorescence on the glass represents the transparent shell, and the pink nucleus, in the centre, the yolk. (Applause).

If I could get a sufficiently high vacuum you would not see that so-called yellow or pink yolk at all; there would simply be a series of luminous striæ.

I lectured 24 years ago at a Working-men's Institute and showed that very same apparatus. I then explained that beyond the fact that it was an exceedingly pretty and charming illustration of the discharge of electricity in a vacuum, there was no use for it! Yet you see 24 years afterwards there is an important use found for the discharge in vacuo.

A still higher vacuum will show a much better result in what is

known as the Geissler tube. The Geissler tubes are simply vacuum tubes. When the study of electricity in a vacuum first became necessary for the lecturer, these tubes (on the screen) were manufactured in Germany, and I am bound to say that although I have had them now close upon 25 years, they are as good as they were the day I bought them, and are therefore somewhat precious, as I have never found others quite so good. Perhaps it is that old associations always make one think that in the days when one was younger things seemed very much better.

I have seen some very beautiful tubes, but have never seen any prettier than these are. (The lecturer experimented in the dark). (Loud applause). While that is going on, for the benefit of those at the side who cannot see, I have here another vacuum tube of a different make and a different shape, and I will allow the discharge to pass through my fingers from the tube. (Exhibiting the same). Now those different colours that you see are due to gases of different kinds in a very attenuated form, probably the 300th of an atmosphere.

The first tube contains a trace of phosphoretted-hydrogen ; here we have hydrogen only. There you have an attenuated atmosphere of oxygen, and here you have hydrogen and oxygen, in a double division. You notice that instead of there being the yellow or pink spark or yolk of the Electric Egg, we have here lustrous striæ discharging from one pole to the other, positive to negative ; and notice that the poles of this bottom tube change colour on altering switch.

I do not know whether it is dark enough for you to notice, on switching off the current, the phosphorescence in the top and bottom tubes and the summer lightning, as I call it, which you see flickering. (Applause). All this is very pretty and very interesting, but beyond being an illustration of a discharge of electricity in a certain vacuum, it is of no utility.

Now we come to the Focus tube, and here is an interesting little fact which perhaps may be of some importance in the history of the evolution of this process. Sir Benjamin Richardson in 1868 read a paper before the British Association at Norwich, and exhibited a lamp constructed so as to show the transmission of light through the structure of animals' bodies ; and he really repeated the experiments of the great Priestly, who showed that, on passing a discharge through the fingers from a Leyden jar, their structure became luminous in the dark. The bones of a child's arm, as shown by Richardson in 1868, could be distinctly seen by means of subdued light ; also in very thin children the outlines of the heart and the ribs could be seen. Of course I was not there to see them, but there is no doubt that it took place ! But that was a very different thing from the X Rays, being really incandescence of a sort, and without the peculiar luminous effect that we get by means of these rays ; in fact, I shall show that the rays have no colour, you cannot see them ; and then I will show you by means of a screen, made of cardboard coated with potassium platino-cyanide, that these rays have the power of making this particular chemical substance phosphorescent.

This is the Jackson tube of high vacuum that produces these peculiar effects. It consists of a thin glass globe with a tube at each end ; to the ends of tubes are welded the fine platinum wire terminals, the wire at one end being attached inside tube to the anode platinum reflector of thin foil left side of globe ; and at the other to the concave cathode

aluminium disc ; on causing the discharge to pass through the tube from a coil, the electric waves from the cathode are thrown on to the anode, which, being at an angle, reflects or focuses the discharge in cone form to a sort of bombardment on bottom of globe inside ; this seems to cause other rays to be repelled from the outside surface of the globe and produces the form of ray which has the properties I have mentioned. This tube is practically the same as the Geissler, and only differs in form, it being simply a question of the vacuum. I believe this one carries only two millionths of an atmosphere, therefore you may say it is almost a vacuum. An absolutely perfect vacuum is impossible, but you can get very near it. (The lecturer experimented in the dark).

That is all you have for seeing the invisible. I will now place a black cloth in front of this tube and cover it up ; now you see there are no visible rays through that cloth, but you will observe how the chemical screen is lighted up with the rays that pass through the cloth. We might have the light quite out and see whether I can show you the bones of my hand and arm. I do not know whether all present will be able to see them. Can you see the bones in my hand and arm ? (Loud applause). Those who wish can view them afterwards, also their legs, arms, ribs, and anything else they like ; but it is somewhat difficult to see the trunk of body unless the room contains a dry atmosphere. Owing to the presence of so much moisture, due to gas and evaporation from our bodies and respiratory organs, the current leaks. The tube requires heating with a spirit lamp in this way for good results ; and in such an atmosphere the damp will most likely so attract the internal discharge of the tube that perforation of glass may result. (One tube perforated after the lecture while exhibiting ribs and liver).

There is evidence of an electric discharge with these rays from surface of tube. I have simply shown you that these rays have no light ; you saw the black cloth over them, and you saw the peculiar action they had upon this potassium platino-cyanide screen. It was, I believe, in experimenting with some similar chemical that Professor Röntgen (I understand he is coming to England to tell us all about it one of these days) first noticed this peculiar phosphorescence. Then, I believe (I am only speaking now in a popular way from newspaper information, which, as you know, we must always accept with a good deal of reserve, especially special telegrams), it was to a certain extent accidental that some objects were placed in a box containing photographic plates, which photographic plates, so the story goes, were used for some other purpose, and the professor noticed that there were some bodies photographed on those plates which were foreign to the subject that he had been experimenting with. He immediately thought of these rays, tried some object on the plate which was enclosed in the box, and there was the discovery ! It is these simple things which very often lead to such great results, and I believe that this particular application of electricity is certainly going to be of the very greatest use to surgery in the future. Of course all the stories that you hear of these wonderful so-called discoveries, that you can see whether you have a diseased heart and all that sort of thing, are not accurate and are exaggerated ; but most certainly you can see the heart as a shadow with the screen—the tube being in proper electrical condition. You can also see the liver rising and falling in a most beautiful way ; you can see the ribs, you can see the skull, jaws, and teeth ; you can, of course, see the bones of the body indiscriminately just as you like and please to look at them—always provided you have

practically studied how to work your tube. It is only by many failures that I have been successful in my work, and I hardly care to say "successful," for, although many useful results have been my lot, perfection is not yet arrived at. These tubes are like babies; they require a good deal of feeding (with electricity), they require a good deal of attention, they require sometimes a good deal of warmth by means of a spirit or gas lamp—a little globule of mercury in the tube would assist this ; and then they sometimes faint, or there comes on a fit of hysterics, the electric current flies about in little waves and globules all over the glass, and you cannot get that little red spot in the reflecting anode of platinum. Until you get that little red-hot spot, from which all these peculiar rays are radiated, the tube is not worth a brass farthing for penetrating purposes. Now these tubes are not to be obtained really as you want them, only a certain per centage being good. I know that. I have been working with my friend Mr. Moore at the Miller Hospital, very cordially, and we have had many disappointments and failures. Indeed, I remember on one occasion (last March), when we were at a certain little hospital taking broken ribs (which were a success), a favourite tube broke, and I believe I am correct in stating that my colleague shed tears! We were really fond of that tube, because we had done a great deal of good work with it. It is astonishing how easily you get into a bad temper over these rays; I do not hesitate to say that the Röntgen ray tube produces language almost equal to golf.

To take a photo or shadowgraph, the body to be acted on must be placed between the tube and the plate, film side next to the subject to be operated on, which again must be in actual contact with the black paper covering the plate. It is best to place the sensitive plate in a double bag of black paper, which should be chemically pure.

Heating the tube by means of a spirit lamp is undoubtedly necessary if you wish to obtain the best results, such as cellular tissue of bones ; indication of muscles ; and sharp negative of ribs and spine, shoulder-bones, thigh-bones, trocanta, pelvis, skull, etc. It is curious to observe how the green phosphorescent electric fog clinging to the interior of tube lifts when strong heat is applied to the exterior.

One might be tempted to say that here is force assuming form, and that the red-hot anode surrounded by a photosphere of electric atmosphere or fog represents a miniature sun.

The rule I follow for obtaining good shadow negatives is long exposure and long development with a diluted developer, hydro-quinone being most decidedly the best.

You will notice that in several cases the prints that I shall distribute, after showing lantern slides on this large screen, show the structure of bones more or less perfectly. It is important to note that, although I have taken some 200 negatives, no action on the skin or hair of patients has taken place.

(The following slides were then thrown on the screen, by means of an oxy-hydrogen focus lantern).

Slide 1.—Hand of boy 4½ years old, showing incomplete ossification of bones. Carpal showing only 4.

Slide 2.—Hand of boy 9 years, showing further development of carpal bones to 7.

Slide 3.—Hand of boy 12 years. Carpal to 8.

Slide 4.—Arm of adult, showing bones of arm, elbow joint, and soft and hard tissue of bones, also indication of principal muscles.

Slide 5.—Dislocation of arm of boy aged 15 years, showing incomplete ossification of elbow joint, as compared with slide 4.

Slide 6.—Hand of adult, with advanced deposit of urate of soda, commonly known as chalk gout.

Slide 7.—Collis fracture of wrist, the cob-web effect on bones being due to intense inflammation.

Slide 8.—Arm of adult suffering from rheumatism, due to old injury to elbow joint, the indistinct or cob-web edge due to the inflammation.

Slide 9.—Arm of adult age 65. Bones perfect, except elbow joint, due to injury when 14 years of age.

Slide 10.—Bones of wrist.

Slide 11.—Knee joint, showing principal muscles of leg, and soft and hard tissues of bones.

Slide 12.—Hand of adult, with saloon pistol bullet between second and third fingers.

Slide 13.—Spine and ribs of adult, showing faint indication of heart.

Slide 14.—Dislocated wrist, the radius being jammed over carpal bones of wrist.

Slide 15.—Heel and ankle, showing cell tissue of bones and achilles tendon.

Slide 16.—Arm with bullet wound in radius, completely severing the bone.

Slide 17.—Spine and ribs of girl of 15 years, showing position of heart and liver.

Slide 18.—Hand, with darning needle lodged over carpal bones.

Slide 19.—Fracture of leg bone, tibia being completely divided, also showing grain of wood of splint used to keep bone in position.

Slide 20.—Fracture of tibia and fibula of leg just above ankle, showing absolute division of bone.

Slide 21.—Foot of adult, showing all principal bones and joints.

Slide 22.—Arm, showing calcareous deposit in rings at elbow joint.

Slide 23.—Here we have the slide showing the case (I am sure I shall be pardoned for mentioning the name) of Lieutenant Maurice's arm, of which I had the honour of taking a shadowgraph with Mr. Moore. You see it is a dislocation of elbow joint. At the time of the accident it was supposed that there was a fracture, but the arm was so swollen that it was impossible for even the best surgeons to be certain, and in this case the eminent surgeon, Mr. Howard Marsh, suggested to General Maurice that the arm should be shadowed. I came to the patient, and there is the result.

Slide 24.—In the next slide is shown the final result, due to what the surgeons saw in slide 23—the elbow joint in perfect position, in which it was placed ; and now I believe the arm is perfectly well and as strong as ever. (Loud applause.)

(Since the lecture, another photo. of arm has been taken, which shows that the joint is in perfect position).

Ladies and gentlemen, I thank you very much indeed for your kind attention. I hope I may have amused you for a short period in a popular way, and if any of you would like to see the photographs that I have here they can be handed round to you, and you will there see some curious results of the process. I thank you very much. (Loud applause).

DISCUSSION.

THE CHAIRMAN: After the brilliant and entertaining lecture to which we have listened, it would be, perhaps, unreasonable to ask the lecturer to answer any questions, but he has kindly said that he is willing to do so if any gentleman has anything to ask him. Major P. A. McMahon, R.A., who is unfortunately unable to be present as he had hoped to be, asked me to enquire whether there would be any possibility of the rays piercing clouds. I think he had in his mind the recent expedition to Japan and the North Pole to watch the eclipse.

MR. WEBSTER: Well, Sir, that is rather a large order. (Laughter). The rays, you see, affect plates; they affect photographic plates quite 30 feet away, but I do not know whether they could be utilised for piercing clouds. It may be that a clever mechanic might dodge it up, but I do not see myself how it could quite come in. You see with these rays you have to interpose a body between the light and the plate. Now in that case you have the cloud interposed between the sun and the plate, but you have your tube unfortunately on the wrong side of the clouds. I do not know whether you could do it by reflection. I have ideas that the curious uprushes of sun storms might be photographed without waiting for an eclipse, but this requires expensive apparatus and continuous experiments.

THE CHAIRMAN: We have been told that our letters can be read also.

MR. WEBSTER: Yes, the ink, if metallic, can be seen in sealed letters.

THE CHAIRMAN: I think Dr. Moore, who is here, will be kind enough to give us the benefit of his experience.

T. MOORE, ESQ., F.R.C.S.: Colonel Trench, ladies and gentlemen, when I was asked by Major Abdy to say a few words to-night, my native diffidence inclined me to say no, but I thought it such a compliment to be asked to speak before such a great assemblage of gentlemen, all highly educated and scientific men, that I felt it would be churlish to refuse; at the same time I am afraid I shall not be able to say very much that is new, as my friend Mr. Webster has told you almost everything that there is to be told about this very interesting process. I was asked to speak more especially about its uses in surgery. I believe, in fact I feel sure, that its uses in that direction will prove to be very great. I am sorry to say that we cannot do a great deal at present because the thing is quite in its infancy, but still something has

been done. I felt sure when this process was first talked about that it would be very useful, and I made up my mind to try to learn to do it myself ; but at that time it was impossible to get the apparatus—the coils, such as Mr. Webster showed you to-night, were only made as toys, and what few there were were bought up immediately by men who wanted to work at the process ; I remembered, however, that my friend Mr. Webster had a coil in his house, so I went and asked him if he would be kind enough to lend it to me. He said immediately that he would if he could find it, but he said "I am not going to waste my time over that tomfoolery, you know." He fished out the coil from underneath some rubbish in his studio, and I got it put in order and brought it down to his chemical laboratory at the Blackheath Art Club. I took that coil up myself to the makers, in the centre of London, and I remember how I was jeered by the boys and sneered at by the men, and nearly taken up by a policeman who thought I had some kind of infernal machine with me. But I had it put in order ; I purchased some tubes and I asked my friend Mr. Webster, who I knew was a good electrician and photographer, to help me to work at it ; and he very soon got a good deal more enthusiastic over it than I am, and the result of his enthusiasm he has put before you to-night. This process, of course, will be most useful in fractures of the limbs. Before you could photograph a bone a fracture was put up in splints in a comparatively haphazard style, and it was generally very uncertain whether the two fractured ends of the bones were brought together straight ; but now after you have set the bone you can photograph it and make quite sure, as Mr. Webster has shown you by the aid of the lantern slides, that the two ends are in apposition. We have had two or three rather dreadful-looking fractures shown to us to-night, and one where the bone was so smashed that it was a terrible thing, but I am sorry to say that my friend Mr. Webster was a little wrong about that—it has never been put straight, it had been fractured for six or eight weeks before it was photographed. But that kind of thing cannot happen now when the bone can be photographed immediately after it is set, even through the splints.

I thought the best way to illustrate this subject was to bring a few photographs that I have taken just lately. Here are some. This process is very useful in taking needles out of hands and feet. These two photographs I will pin together, and ladies and gentlemen will perhaps be kind enough not to pull them too far apart ; they are two hands with needles in them (handing round the same), and you will see the needles show very plainly indeed. A needle or any other object shows most plainly when it is placed next to the sensitive plate during the photographic process. That is very well shown in one of these photographs. It is the hand of a lady (and I hope the ladies will be interested) with a gold bracelet on her wrist, and you will see that one side of the gold bracelet is very much plainer than the other. The palm of the hand was placed on the sensitive plate and the locket was turned up on to the back of the hand. You will see that the part of the bracelet which was next to the plate shows very clearly, whilst that on the back of the hand is comparatively faint. Now I make those few remarks in order to illustrate the next case, which is that of a knee joint with the patella, or knee-cap, showing. A woman last week knelt on a needle, which went into her knee. The house surgeon at the hospital tried to cut it out by making an incision over the middle of the knee-cap, where it

had apparently pierced the skin, but could not find it. I then photographed it, and was able to tell him "this needle is very faint, so that the probability is it will be found on the part of the joint away from the plate ; I think we had better cut there." We then cut down upon the part of the knee-cap away from the plate and there was the needle in the very spot that the photograph told us. That is about one of the most useful things that I have seen the process do. Here are two feet with needles in ; it was quite easy to draw a line across the foot where we saw the needle, then we drew another line at right angles to that and at the junction of the two we found the needle. Now you not only can get needles out but you can distinguish inflamed from healthy joints by this process. Here is a case of the two hands of a woman who had a bad accident to one of her wrists, and very much inflammation followed, especially of the bones and joints of the hand. You see one finger is crooked and the small bones of the wrist are glued together by inflammation. If you raise up the picture and look underneath it you will find one of the bones of the other hand, they are all quite distinct from one another.

Here is another case, and a very good one, of an excision of the knee joint, with a wire put in to keep the bones in their places. Here is a very pretty (!) photograph of a face. This is the face, you will hardly believe it, of a very good-looking boy, about 15 years of age ; but of course only the bones shown. He has a tumour in his jaw, and you can see the place where the tumour is, looking like a hole in the bone. This other hole is his eye, or rather its socket. This projection is not his nose, it is his upper jaw ; the nose is represented by a hole above. The jaws were kept open by a piece of cork, but this does not show at all as the Röntgen rays go through it.

Here is another case, very like the one Mr. Webster showed you of Mr. Maurice. A woman had had her elbow dislocated for five months. It was treated, in a large country town, as a fracture. She came to the Miller Hospital with the arm very painful, swollen and fixed in a straight position. A photograph showed merely a dislocation ; we put it in, with some difficulty, under chloroform ; but it does not seem to be quite so well in as the one shown you by Mr. Webster, because during the five months a thick material (lymph) formed in the joint, which prevents the bone from going quite into its place. Still there is a good movable joint.

I think, ladies and gentlemen, that this process will become more and more useful as time goes on and we find out more about it, and get better tubes and other apparatus.

It was supposed that the fluorescent screen would be the most useful part of the process, but at present it scarcely comes up to the expectations formed of it. It is very pretty and shows the bones of the extremities very well ; but it does not show much of the bones of the body, for one reason because one has not yet been made large enough.

I will not weary you by saying much more, but I will remark that anyone who meets with an injury to a bone or near to a joint in the future will be very foolish if he does not have it photographed, especially after it has been set, to make quite sure that it has been properly done.

I am obliged to you, ladies and gentlemen, for the patience with which you have listened to me. (Applause.)

General Maurice : Colonel Trench, ladies and gentlemen, there is one point in connection with what Mr. Webster has called the evolution of this method and system which his modesty and Mr. Moore's has prevented them from bringing before you, and therefore as I happen to have had strong reason to know about it, I want to draw your attention to it. Some of you may not perhaps be aware that in the greatest scientific address of the year, that which sums up the entire scientific results of the year, the work which Mr. Webster and Mr. Moore did was taken by Sir Joseph Lister, the President of the British Association, as the most important work of the year. Unfortunately, from certain prejudices of Mr. Moore's profession, which perhaps we see more easily from outside (and we may have them in our own) than perhaps they do from within, it happened that the report of the whole of these proceedings, from which Sir Joseph Lister took his account of that particular operation, was one which a very old friend of mine, who is also a most distinguished surgeon, Mr. Howard Marsh, had given as of a case of his own in the "British Medical Journal," and therefore it so happened that as he was simply dealing with it as a scientific case, the names of Mr. Webster and Mr. Moore were, according to professional etiquette, necessarily omitted. Sir Joseph Lister was therefore, as regards their share in the transaction, not altogether correct as to his facts. He attributed to Mr. Howard Marsh what he had not actually done. To Mr. Marsh I am personally indebted in so many ways for unlimited kindnesses, that I should be exceedingly sorry to deprive him of anything that is his due, but had he not been obliged by pressure of business to be absent, he would have been down here to-night and stated the facts himself. It so happened that Sir Joseph Lister attributed to Mr. Howard Marsh the practical dealing with the operation of the setting of the arm, whereas in fact Mr. Howard Marsh had nothing to say to it. His great service, on which everything turned, was in recommending the application of these rays. That application was only possible because of the previous work and experience of Mr. Moore and Mr. Webster. After the photograph had been taken by Mr. Webster, the thing was an absolute bagatelle. There is not a single person in this room who would not have out-faced the whole College of Surgeons if they had dared to tell him after the photograph that it was a fracture and not a dislocation ; the photograph spoke for itself, and so distinctly spoke for itself, that when, almost immediately afterwards, I took it up to Mr. Howard Marsh, he said, "My goodness, we shall have to mind our p's and q's after this, because if I were to try to humbug a jury after this about any operation, they would produce a photograph and say, 'That is not a fracture, it is a dislocation.'" Within a very few minutes the operation was done, not by Mr. Howard Marsh, but by our own army surgeon, Captain Salvage, who put the patient under chloroform and put the arm immediately into its place. I was anxious to emphasize that point, because as a side issue I think that any hunting man or anybody else who meets with a serious accident, and allows any surgeon on this earth to touch his arm without having the Röntgen rays applied to it, is such a great fool that he ought to be ashamed of himself. But that incident, as Mr. Howard Marsh said to me then, was absolutely the first time, as Mr. Webster has told you, that the Röntgen rays had been applied to surgical diagnosis, and therefore it is to Mr. Webster and to Mr. Moore that we owe (and much as I am personally indebted to them, this is a much more important matter than that of any single

case) that enormous advance which has been derived from the use of the Röntgen rays, which had been really of very little use until they obtained that result from them. Therefore, I think that in rendering thanks for the lecture which we have heard to-night, we may render thanks for a very great advance in science, the mutual co-operation in which, of Mr. Moore and Mr. Webster, we have had fully put before us.

THE CHAIRMAN: It only remains for me upon your behalf, ladies and gentlemen, to thank Mr. Webster for his most interesting and brilliant lecture, to which we have listened with such great delight. (Loud and prolonged applause.)

THE SCIENCE OF FRONTIER DELIMITATION.

BY

LIEUT.-COLONEL J. K. TROTTER, R.A.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 10th Dec., 1896*):

MAJOR-GENERAL F. J. MAURICE, C.B., IN THE CHAIR.

THE CHAIRMAN—I am sorry to say, gentlemen, that Sir Henry Brackenbury very much regrets that by a mistake as to the date of his engagements to-night, he is not able to come down and take the chair here; it is a great loss to us, because, of course, what he would have been able to say about the Indian and other frontiers would have been invaluable. I am sure we shall all like to hear Colonel Trotter, who will have very much to tell us, from his own experience on the Niger, about the subject of frontier delimitation (applause).

COLONEL TROTTER—General Maurice and gentlemen, when your Secretary asked me to come down and deliver a lecture here on the subject of boundary delimitation, I accepted the invitation with little hesitation, but when I came to consider the matter afterwards, and to look at the title of the lecture he asked me to deliver, I felt that I had been not a little presumptuous. To deal with a subject like this, "The Science of Boundary Delimitation," a man ought to be an expert in every branch of delimitation, and a past master in all matters of science connected with it. I can make no pretence at all to be anything of the kind; the most I can say is that I have taken part in boundary delimitation and that many of the conclusions which I have come to, that such and such a course is the right one under certain circumstances, have been come to by adopting the opposite course myself and finding the disadvantage of it. All that I can do for you this evening is to give you some of the conclusions that I have arrived at from my own experience, and I know that there are some here present who have already taken part in frontier delimitations under circumstances very different from those of the country that I was in, and I hope I may be able to gather from them some of their experiences which no doubt will be as interesting to me and will be able to enlighten me as much as anybody else.

Boundary delimitations may be divided into two classes: (1) Those between civilized states, where there exists a high class geodetic survey, or where at least the country is well known, and the facilities of transport are such that instruments of the highest precision can be used for fixing positions. The boundary delimitation between Canada and the United States is an instance of this class. In that case no geodetic survey, indeed, existed, but the work was carried out by a highly scientific and large commission, and the positions were fixed with great accuracy. The 2nd class of delimitations is that of which we have had so much experience in recent years, where the country is little known, sometimes absolutely unexplored. It is this class which I propose to deal with this evening, for delimitations of boundaries between civilized states are rare, and when they are undertaken, are confided to large commissions of highly scientific men entrusted with the best instruments available, with whose methods it is beyond my province to deal. In the more common case the cost of exporting scientific men and instruments to bad climates is prohibitive; and, indeed, they are not necessary there, for there is no object in defining to a foot positions in a country about which nobody knows anything at all. There are other delimitations which occupy a position half way between the two classes I have mentioned, of which those in Eastern Europe and Asia Minor after the treaty of San Stefano, and those of our N.W. frontier of India are examples. I hope we may hear something to-day concerning some of these boundaries from some of those who have assisted in delimiting them.

My first proposition with regard to boundary delimitation is that it is from beginning to end an affair of geography and topography treated in a diplomatic way. It is an affair of geography in that you must fix the position on the earth's surface of the terminal points of the boundary and of the principal intermediate places; and of topography in that you must give a representation on paper of the country adjoining the frontier. It is clear that it is of very little use to delimit a boundary, unless you are able to show where the boundary is, and unless the adjoining country is so reproduced on paper that the direction of the line and the position of all important places and physical features with reference to it can be readily understood by those whose business it is to deal with frontier questions, and who are never likely to go near to it. It is, of course, possible without any great exercise of geographical or topographical knowledge to put up a lot of beacons to indicate the direction of a frontier line, but these at best only serve to instruct those who live close to the line, and to indicate to them a position they can dodge behind, when circumstances are unfavourable to their neighbours, whilst the authorities are in entire ignorance of the manœuvres which are being carried on.

But the importance of a knowledge of the geography and topography of a country does not begin with the delimitation of the frontier; on the contrary, such knowledge is in some ways of even greater importance before the question of delimitation arises at all. This leads me to my 2nd point, that before a boundary can be delimited, you must

have a boundary to delimit, and that the necessary preliminary to delimitation is a treaty, an agreement, a protocol, or some diplomatic instrument fixing the way the boundary is to be drawn. From the point of view of delimitation a great deal depends upon this instrument, and especially on the wording of the clauses which define the frontier. It is most important that they should be clear and distinct, and that no ambiguous expression or words, which can be interpreted in two ways, should be used. The diplomatists should know exactly what they mean, and should state it clearly and concisely. A fine word or a well turned phrase, like the unintelligible part of a legal document, has got to be paid for sooner or later. The simplest words will be found cheapest in the end.

It is also very important that as little as possible should be left for commissioners to decide on the spot. In almost all cases time is a matter of the first consideration in boundary work. If the task is not completed before the rains commence, or the season ends, a second commission must be sent out the following year at great expense. It is very difficult for commissioners with opposing interests to come to an agreement when matters are left entirely in their hands. Each officer naturally seeks to do the best he can for his country's interest, and it rarely happens that the claims of one side or the other are so clear and indisputable as to be acknowledged at once by the opposing side. Even if one commissioner gives way, he probably makes a circumstance of having done so, and expects compensation in some other direction, which means the re-opening of a long discussion. In my recent experience we barely concluded work before the commencement of the rains; if we had had to spend any considerable time in discussing claims to particular districts, the commission would almost inevitably have been wrecked. It is easier, so far as I understand the matter, for diplomatists, who have a broad view of the whole question, to make concessions in drafting an agreement than for commissioners, who are mainly interested in seeing that they don't get the worst of the bargain, to give any point away in delimitating it on the ground.

It can easily be understood that for every reason it is desirable that a boundary should follow natural features. It will generally be found that natural features are used to divide tribes and races, and when these have in some instances pushed beyond the natural barriers, it is an easy matter to make them withdraw. A river forms, so far as my experience goes, an excellent natural frontier, by far the best from the delimiter's point of view, for it requires no delimitation. A river delimits itself. I am aware that there are certain disadvantages connected with the adoption of a river as a frontier, such as the question of water rights, navigation, the right of diverting the course of the water, etc. In using the term river, however, I do not intend to refer to small streams, but to the main drainage lines of a country.

A mountain range makes a good natural boundary, particularly if it is well defined. But a mountain boundary must be delimited, and whether the line is drawn along the watershed, or follows straight lines joining the principal peaks, the ground must be examined closely.

A conventional line, *i.e.*, a line drawn without any reference to

natural features, such as a straight line joining two fixed points, a parallel of latitude or a meridian of longitude, makes a very unsatisfactory frontier and one very difficult to mark off. And yet, when nothing is known of a country, such lines are unavoidable. When two fixed points are joined by a straight line, it is known how much territory is included on either side of them; and when the exact position of one or more places in the territory adjoining that where the boundary which is being negotiated lies, are known, by adopting a parallel of latitude or a meridian of longitude as a boundary, it is easy to calculate how much territory is included within the frontier. If, on the other hand, the country being little explored, natural features, whose existence may be known, are used as boundaries, when these come to be examined, it may be found that their direction is very different in fact from what it had been imagined, and that the effect of the division agreed to is not at all what had been intended. In such cases, where the country is almost unexplored, geographical co-ordinates being fixed lines, and having a known distance from fixed points, divide a territory better than physical features whose course is unknown. This is the most that can be said for conventional lines, and that it should be necessary to adopt them at all is a reflection on the topographical qualifications of those who first obtain treaties which lead to such boundaries.

Before concluding this branch of the subject, I think special attention should be drawn to the importance of the delimiting commissioner, being thoroughly conversant with the negotiations preceding the signing of the boundary agreement. During delimitation, incidents may arise, discussion on points in the agreement, the exact meaning of the wording, the reconciling or compromising of conditions, which, the survey of the ground makes it clear, cannot be carried out, and various other matters. If in these cases the commissioner has not mastered all the steps which the negotiations have passed through previous to the signing of the treaty, and the reasons for adopting the boundary as agreed upon, he is sure to find himself in difficulties, and may be led to commit serious mistakes.

I have so far dealt with matters which precede the appointment of a delimitation commission; I now go on to consider the work to be done when the commissioner has been selected. The first duty of this officer is to collect his instruments, stores, supplies, to arrange for a survey section from the Ordnance Survey, if a section is to accompany the commission, to draw their arms, equipment, camping necessaries, ammunition and food supplies, and to place himself in communication with the Foreign or Colonial Office, according as he is employed under the one or the other, and with the Intelligence Division of the War Office, so that he may be coached in all matters connected with the country he is going to.

As regards instruments, I think in most cases the following list includes all that is necessary:—

1 6″ alt. azimuth theodolite reading to 10″.[1]

[1] A second 6″ azimuth theodolite for triangulating purposes, though not essential, would be very useful, and it would save the first theodelite from the knocking about which the instrument used for triangulating must suffer.

1 6″ sextant reading to 10″.
1 Artificial horizon and mercury.
1 Spare bottle of mercury.
1 Large prismatic compass with tripod stand, for taking magnetic variation and for general use.
3 Pocket prismatic compasses.
3 Plane tables—complete.
3 Sketching cases.
3 Cavalry sketching cases.
1 Perambulator (as strongly built as possible).
1 Chain.
2 Or 3 steel tapes graduated to read yards on one side and metres on the other.
1 Good aneroid barometer.
2 Good ordinary thermometers.[1]
4 Heliostats (if heliographs are not taken).
2 Good field-glasses.
2 Good field-telescopes.
3 Half chronometer watches (keyless).
1 Apparatus for determining longitudes by absolute methods, either transit instrument, astronomical telescope or Capt. Hill's camera. The last can be used by anyone with very little training, the only drawback in its use being that the calculations cannot be done locally.
A quantity of decimal paper ruled to the scale on which the field work is to be done.
Plenty of white and black cotton for making flags for trigonometrical points.
5 Dozen Union Jacks to be given to chiefs and headmen of border towns cut into English territory.
A number of scales for use in the field (scales should be divided to read metres when working with commissions from countries using the metric system).
A number of blank sheets of mounted paper with a projection on the scale to be used on the field.
It is very desirable that the commissioner should be able to communicate with his foreign colleague during the preparation stage and should agree with him on the scale to be used for field work. This precaution will save much complication later on, and the commissioners will be able to give each other much assistance in the survey work.
A pedometer may be taken, but it is not to be depended upon and acts badly when the ground is not hard and firm.
A good case of instruments should be included, and a despatch

[1] Ordinary thermometers are, I think, preferable to maximum and minimum thermometers. The minimum thermometer is very liable to get out of order, and when, the weather being unbearably hot, it reads (as ours did) 20° below freezing point, it is apt to become annoying, and there is some danger of the instrument being broken.

box with register book and stationery. The Ordnance Survey will supply in addition the stationery, drawing materials, instruments, etc., necessary to complete the requirements in this line.

A camera well provided with plates must not be omitted.

Nautical almanacs, "Hints to Travellers," etc., etc., will, of course, be included.

As regards stores, no regular catalogue can be given. The quantity and description depend on the country. Good brandy and whisky should be included, and several dozen pint bottles of champagne, which is a most valuable restorative after fever or exhausting work. But while carrying these stimulants for emergencies, it is advisable to use as little as possible of them when in good health, and never to touch alchohol during the day-time.

A plentiful supply of drugs in tabloid form should be taken.

In addition to the ammunition carried with the rifles of the R.E. party, some sporting cartridges should be taken, and 500 rounds or so of ammunition, per shot gun, carried.

We now pass from the stage of preparation to that of actual work. On arrival in the country where the boundary is to be delimited, if a sea voyage has been made, the commissioner must read his aneroid at sea level before leaving the coast. If he starts from some inland station his aneroid must be compared with a standard barometer, or it must be read at a known altitude. From this time forward the aneroid should be read twice daily, as far as possible at the same hour, say first thing in the morning and again in the evening or at noon. The thermometer should be read at the same time, and the readings of both instruments should be entered in the margin of the diary or in a special book, the exact hour of reading being entered opposite them. At the starting point also, or at the nearest point to the boundary which is well fixed in longtitude, observations for time should be taken, at least one east and one west star being observed. A second set of observations should be taken at the same place some days later, from which a rating for the watches is obtained. The watches should be compared daily, as far as possible at the same hour, one of them being used as a standard, and the result should be entered in a book. It can then be readily seen if any one of them is behaving irregularly.

As soon as the commission arrives at country which has not been well surveyed, a careful route traverse should be commenced, the cavalry sketching case being used, the distances taken by perambulator and checked by observation of pairs of stars for latitude at each halting place. If a pair of stars cannot be observed, circummeridian observations of one star should be made. Whenever the commission halts, observations for time should be taken on the first and last night. By this means, on arriving at the initial point of the boundary to be delimited, a very near estimate can be made of the longitude. But it will not do to trust to the route traverse and time observations, and

some method of determining longitude absolutely must be adopted. This means that about a fortnight must be spent in carrying out observations, unless Capt. Hill's camera is used, when three or four days would suffice; the moon also should be in the first quarter. With Capt. Hill's camera, it should be within a few days of full moon. It is best to arrange the march up with reference to these conditions, but in case the boundary is reached at a time when the moon is not in a favourable quarter, a longitude of some other place on the boundary may be determined, provided that it is carefully connected by triangulation or by the best means available with the initial point of the boundary.

The latitude of this point should be determined by one or two circummeridian observations of north and south stars with about the same elevation. In taking circummeridians, about eight pairs of observations should be made of each star, and each pair should be worked out for latitude independently. In this way any very discordant results can be eliminated, and it is easy to see whether the watch's time of transit has been correctly found.

Longitude observations need not be worked out on the spot, unless a meridian is being run.

For carrying out the survey of the boundary, a triangulation is by far the best method. It involves a considerable amount of labour, and if the country is covered with bush, it becomes a matter of great difficulty; nevertheless, if it can be managed at almost any cost, it pays well. It gives a permanent value to the work, and puts every plan and every physical feature into its place with great accuracy. With the fixed points obtained from a triangulation, the filling in of the topography becomes a very simple matter. Such a triangulation cannot, of course, compare with the geodetic survey of a civilized country, a work which is executed at great cost and which takes a long time to complete; but it will be found quite accurate enough for the scale on which boundary maps are drawn, and if made with reasonable care, it will fit on to fixed points with great exactness.

In carrying out such a triangulation, and indeed in all other departments of the delimitation work, one has to make a compromise between what is desirable and what is possible. Just as in a soldier's training, many regulations strictly enforced in peace time have to be thrown overboard on service, so in boundary survey work, and delimitation many matters which are considered indispensable at home must be sacrificed to the difficulties of country and the exigencies of time. For an account of the modification of the rules in force on high class geodetic surveys, which may be adopted in boundary work, I know of no better advice than that contained in a small pamphlet on "Rapid Triangulation," by Major Hon. M. G. Talbot, R.E., compiled at the Intelligence Division. It is very desirable that the country to be triangulated should be reconnoitred first, but I doubt if this is often possible. If it is unexplored, and is covered with bush or otherwise difficult, a reconnaissance involves much labour and the expenditure of much time. It means the deciphering of the boundary more or less

carefully, and doing the work which must be done all over again when the boundary is delimited. If a reconnaissance is impossible, it is very useful to send on a skilled man to fix flags on suitable positions. By doing this, all risk of error in recognising points observed is removed. But even this precaution is very often difficult to carry out. In my experience it was seldom successful. The rate of progress in a densely covered country is so slow, the difficulties of cutting a way so great, and the risk of going astray so serious that we rarely found that the man sent on reached the spot he was sent to, and fixed his flag in time to be of service.

The first step in the work of triangulating is to measure a base as far as possible at right angles to the general direction of the frontier. This should be carefully done by men trained to the work, as it will rarely be found that there is open, level ground in a position to be available. But, even if the measurement of the base is not correctly done, the value of the work is not destroyed, provided that the triangulation is consistently carried out, and that the opening and closing points are fixed, for the error will be constant, and all that is necessary is to fit the triangulation on to the fixed points and to add or substract a percentage to or from each computed side and the base.

After the base has been measured, an observation should be taken for finding its true bearing, and at the same time the magnetic deviation of the compasses used by the commission should be found. The latitude and longitude of one end of the base line should be fixed. If the position of the base is such that it is not easily possible to do this, it will be sufficient to connect the end with the point which has been fixed in latitude and longitude by making it a trigonometrical point.

The most important and at the same time the most difficult part of triangulation in rough country, is to recognise the points which have been observed. Failure to do this will lead to the survey breaking down, or to the introduction of serious errors. The observing party must in the first instance, in entering the round of angles in the field-book, describe both in writing and by a rough sketch each new point when first observed. In addition to this it is useful to set off the angles as observed on a plane table, and to make a rough sketch of each point at the end of the ray directed on it. But the best precaution, according to my experience, is to take a careful magnetic bearing of the R.O. at each trigonometrical station. From the observed angles the bearing of each point observed is easily ascertained, and on advancing to these stations, the back bearing to the station from which they have been observed can be found. For example, you observe a point, and enter in your book (with sketch, "withered single tree just below crest of conical hill"). You proceed to this point. If you could keep your eyes on it the whole time you were moving, it would be easy to recognize it; but what actually happens is this: you drop into a densely covered valley and lose sight of your point, and you move along this valley for some distance, or perhaps cross several ridges without being able to get a view of it. At length you arrive in

the neighbourhood of the place where you expect to find it. A forest of trees has grown up beside your single tree, and your conical hill has turned into a twisted and contorted ridge. As you ascend the hill every tree you pass looks something like your object, but none resemble it exactly. When you are in this difficulty your compass is the only thing to help you. You get yourself into alignment between the back station and your point by the bearing, and you will soon find your tree. Not uncommonly you will find yourself on the wrong hill altogether, and will have to move forward or backward. On several

occasions, during my work in West Africa, we set up the theodolite at points which we were confident were those observed, but the compass said "no." We endeavoured to account for the want of agreement by local attraction or an error in reading the bearing, but we always found that the compass was right, and that we had mistaken the point. Many errors were saved in this way. A further advantage in using magnetic bearings is that in plotting the work the direction of the sides of the triangles can be checked and errors in computation and in plotting discovered.

Care should be taken to keep the principal triangles well proportioned, and to avoid very acute or obtuse angles. The better the triangles, the more will any errors of measurement be minimised.

It is important to intersect all distant conspicuous points from several stations, and it is specially important to cut in by intersections any distant point, which is known or is on a route which has been explored.

As the work of the triangulation is required for immediate use, the triangles must be computed each day as the field-work is done. To avoid error it is most desirable that two officers should work out all these solutions independently, and compare results, so that errors can be checked. The same precaution should be adopted in all astronomical work. It will save much re-calculation in the end, for under the circumstances of delimitation errors are easily made.

The triangles should be plotted as soon as computed, and a chart should be kept up of the triangulation from which the topographer should take his points day by day.

From time to time observations for latitude and time should be made. These will give results less accurate than those obtained from the triangulation, but they will serve to locate errors and to check each stage of the work.

The triangulation must close as it began on fixed points. If there are no such, the closing point must be fixed in latitude and longitude. To test the correctness of the work it is useful, if time admits, to fix

two points about a mile apart to compute the distance between them and to chain it. A comparison of the results obtained by computation and measurement will serve to show what amount of accuracy can be expected from the triangles.

Whilst the triangulation is going on, the topography must generally be filled in at the same time. If possible, the topographer should be a day behind the triangulator, so as to get the benefit of his completed work, but in practise this is difficult to arrange. If there are only two officers available, it is hardly possible for them to be separated. Their duties require that they should be constantly in communication with each other, and that they should meet daily to compute their triangles and observations. This difficulty may be partly modified by remaining two days in each camp, which will generally be necessary, in which case the topographer can work a day behind the triangulator. But he can always utilize the triangulator's work by accompanying him to the observing stations and setting off on his plane table the angles as observed. He will at the same time have the benefit of all the points fixed beforehand. With these it is easy for him to sketch in the drainage, and to fix the position of any towns or features, on a scale of $\frac{1}{100,000}$, which is probably the largest scale which would be used in the field, the trigonometrical points will be rarely more than an inch apart, and with a little practice the topographer can, under these conditions, fit in the work with great accuracy. He must be careful to indicate, as exactly as he can, the points where he cuts the routes of former travellers, or the position of places which have been previously fixed. This point is one of great importance on all work in little explored countries, and it is the keystone of all compiled cartography. A route which runs between two places, the position of which is unknown, or from one known point into the air, is almost valueless, either as regards distances or direction, but the moment it is cut by another route, its value is enormously increased. If the route is more accurate than the boundary survey, it corrects the direction and distances of the survey, but if, as is more likely to be the case, the survey is more to be trusted, it fixes the route and gives a value to all the distances along it.

In addition to the triangulation and topography, the commissioners have the work of delimitation to attend to. They must follow closely the boundary, and must select places for putting up beacons. Circumstances will generally decide what places should be beaconed, and in what way the beacons should be made. It is generally advisable to beacon every road and track, where they cross the frontier, and every important river should also be marked. In a country where few roads or tracks exist, some other system must be adopted, but it should be borne in mind that there is little use in setting up beacons at places where no roads exist, unless roads be made to them; for if there are no roads the beacons will not be visited, and will soon be either destroyed or become overgrown with herbage and be lost sight of. The beacons should, if possible, be of permanent construction. If natural features cannot be adopted, piles of large stones in the shape

of a sugar-loaf with a large base are best. The commissioners of both nations must agree on the positions of beacons, and they should therefore work together in fixing them, but where there can be no doubt about their position, it is sometimes convenient for one commissioner to select the site and build the beacon, leaving the other commissioner to approve it as it reaches the spot.

It is sometimes necessary to put up auxiliary beacons to call attention to the position of others which are in a hidden position. These auxiliary beacons are not on the frontier, but in the territory of one or other of the nations. For example, a boundary changes from a watershed to a parallel at a point which cannot be seen from the surrounding country. In such a case an auxiliary beacon serves to show where the hidden beacon is to be found.

Every beacon, as it is constructed, receives a number, and a careful description of its position must be made. If the country is open the bearing from one beacon to another should be noted.

As the boundary is beaconed off, the local chiefs should be made to accompany the commission, and the frontier should be explained to them. A Union Jack should be presented to each chief of a town falling within the British sphere. The chiefs should be made to understand their obligations, and should be warned against crossing the line. They will probably have much to say on the subject, and will point out how much better they could have drawn the line themselves, so as to have secured their neighbour's territories, and the commissioner will have some difficulty in convincing them that the arrangement is irrevocable; others will point out that they don't want to be delimited at all, if they can't do it in their own way, and many suggestions will be made for a every description of alteration or modification of the line, and for all sorts of commercial and other facilities which chiefs desire to obtain and which have already been settled by treaty. The commissioner in such cases has a difficult task to perform in letting the natives know that no alteration can be made in the boundary conditions as fixed, and at the same time in leaving them contented.

On all occasions guides should accompany the commission, taken from the towns nearest to the place where work is being done. As a rule two guides should be taken, and they should each be made to repeat several times the name of each place. Interpreters will, of course, also be required, but it is not sufficient to take an interpreter's rendering of the pronunciation of the name of a village or feature. The villager should always give this and should repeat it several times.

I will add a few remarks on delimiting the different forms of boundary.

(1) *A watershed.*—

To one unaccustomed to tracing it, a watershed is very puzzling to follow. In a mountainous country, when it strikes clearly defined ridges, which one naturally expects it will run along, it frequently leaves them most unexpectedly, doubles back, crosses the highest ranges at their lowest points, and avoids the principal mountains. It

passes from range to range by low cols, and often takes a line of country which appears to be the lowest in the district, though when actually tested the general level must be relatively the highest. The effect, however, is probably produced by the line so frequently avoiding the high peaks and ridges. In delimiting and survey work, when no previous reconnaissance has been made, there is always a danger of adopting a direction for observing stations and for sending on carriers to fix camp, which, on examination, proves to be quite wrong, the watershed having doubled back or struck a new line, which it is impossible to guess at till the ground is examined. The one rule to be followed is not to trust the watershed to take any particular direction beyond the point to which the eye can actually trace it. Though it may be in front of you and apparently going straight forward, it is quite possible that it will double back and be found on your left or right rear. The more mountainous the country, the slower the progress you make in the general direction of the watershed, on account of its twisting and breaking back. There is this compensating advantage about following a watershed in a mountainous country, that the survey work covers a wider strip of ground than if the line was a straight one. The one great advantage, however, of delimiting a watershed in a mountainous country is that you have no difficulty in seeing how it runs, and, wind and twist as it may, it is not possible to make a mistake about it. But when the watershed is followed in a flat country, more particularly if it is a bush covered country, the work becomes very laborious and errors may easily be made. If the ground is covered with the high elephant grass, so common in tropical countries, it is impossible to tell whether it is rising or falling a few yards away, and you may easily cross small valleys without discovering them. In these circumstances the grass should be burned, if it is dry enough, although bush fires seriously interfere with survey work, and make it impossible to see distant points. The watershed must be felt for step by step, and as soon as you find yourself in a valley, you must try back. Guides should always accompany the commissioners, and they should be constantly asked where the different waters run to. I have noticed that natives, however ignorant and stupid, and I have met many phenomenally distinguished in these respects, are generally able to give correctly the direction of valleys and water-lines.

In a flat country it is difficult to decide on the exact spot for setting up a beacon, if the ground is covered with tall herbage or bush. A clinometer is of some assistance, but it is not easy to use it. A little practice in examining the features carefully, however, and in tracing the watershed between two elevations, will soon prevent errors. In a flat country the watershed does not bend much, and follows the general direction more consistently than in a mountainous country.

(2) *A parallel of latitude.*—

In following a parallel of latitude the first thing is to fix accurately is the latitude of the starting point, if it is not known. This is no less required if the line to be followed is the latitude of a certain place; the

latitude of that place must be known or it must be fixed. The observations must be carefully made, by taking circummeridians of a pair of stars. As it is possible that different results may be obtained by the two commissions, and as it is not likely that the latitude can be found within 200 or 300 yards, since the instruments read to 10″, *i.e.*, to about 337 yards, that amount of error may be expected, taking into consideration the difficulty of getting the refraction exact, and allowing for personal errors, the simplest course is for the two commissions to meet, for each to observe, both parties taking down the angles as observed, noting the times with their own watches and computing the results independently. From the mean of two or three such observations, provided they are reasonably concordant, a good value for the latitude should be obtained and the commissioners should be able to agree on the position of the starting point. For survey purposes, though not for delimitation, the longitude of this point should also be obtained.

When the starting point is fixed, an observation for true bearing must be made from it. The best time for this is at sunset, when it is possible to see through the telescope both a star and some distant object to serve as a referring point. In a country like West Africa it is rarely possible to do this, and day observations must be made, or night observations with a lamp on some point as a referring mark.

If the line is to be run with a theodolite, the usual course is to set up the instrument at the starting point, to lay off the required angle from the referring object so as to bring the telescope into a true east and west line, and to send a man to the most distant elevated point visible in this line, moving him by signal to right and left till his flag rests on the intersection of the cross wires. The instrument is then moved to this flag, set up there and laid on the starting point and the telescope turned 180° in azimuth, not reversed in altitude, for that brings in the error of collimation, and a second flag is fixed in the same way as the first. The vernier plate must be brought round again till the cross wires intersect on the starting point, and the horizontal verniers should be read, to see if there is any deviation from 360°. The defect of running a line in this way is that an error, which may easily occur from any slight displacement of a flag, increases as the line is delimited. To avoid this, the bearing should be carefully taken at each station. A simple and sufficiently accurate method of running a parallel is by using an instrument like the French *boussolle Brossé*, a theodolite compass, consisting of a large compass in a horizontal position, which, by means of a key, can be set so that the readings taken through the telescope are true bearings. The compass is adjusted in a true east and west line, and it is then not necessary to take any forward bearing as long as the back station is visible. The instrument is taken as far to the front as possible so that the back station is visible, and is then moved north or south till it is in a true east and west line with this station. Observations for latitude and time must be taken occasionally in order to check the azimuth line and to carry the meridian distance. The closing point

must be carefully fixed in latitude, so that the work may be verified. Time observations should also be taken. In high latitudes the question of curvature must be taken into consideration if a parallel is being run with a theodolite.

(3) *A meridian of longitude.*—

A meridian is run in the same way as a parallel, the difference being that the starting and closing points must be carefully fixed in longitude. This means that about a fortnight must be spent at each place observed. The results must be computed on the spot. A good triangulation, if accepted by both commissions, would save the necessity of the closing point being observed, provided good observations were made for azimuth of the base. Or, if time is important and the country is of no great importance, both sides might be content to accept a line run from the starting point with magnetic bearings.

A meridian also may be run by latitude and azimuth, *i.e.*, by taking the true bearing of some distant point nearly due north or south, moving to this point and observing the latitude from which it is easy to calculate the distance of the object east or west of the line. This method, however, is only applicable to country where long bearings can be taken, and what with the possible error in latitude, and the setting off of an east and west line from the object to the meridian and measuring it, it is probably not very accurate.

(4) *A straight line joining two points at some considerable distance apart.*—

If the two points are not accurately fixed, this is a difficult line to follow, unless the country should be very open with one or two elevated positions, in which case flags might be aligned between the terminal points. But if the country is broken or covered with bush, this is out of the question. The best course is then to make a careful triangulated survey of the intermediate country, from which the relative position of the terminal points can be fixed and the azimuth from one to the other calculated. If this cannot be done, I know of no other method but to follow the true bearing of one point from the other, as nearly as can be judged, or as taken from the best map available, to note where this line cuts an east and west or a north and south line, as the case may be, passing through the second point to measure the distance of the point so obtained from the second point and also to carefully record the distance traversed from the first point. From these data a corrected bearing of one point from the other can be worked out. The line must then be delimited. This involves going over the ground twice.

In all these forms of delimitation the perambulator should be used to give the distances along the line, and these should be checked frequently by times and latitudes. The commissioners must follow the actual line as closely as possible, and it will generally be necessary to cut a road. If a triangulation is not made, the azimuth will, at any rate, give one co-ordinate to which to refer the topography. The perambulator distances will enable the topographer to obtain a second

co-ordinate. If the total distance is found too long or too short by subsequent observations, it is easy to recompile the topography.

(5) *A line parallel to a road, river or mountain range and at some considerable distance from it.*—

This is probably the most difficult and unsatisfactory form of boundary to mark out on the ground. To draw, for example, a line parallel to a river at a distance from it of 10 miles, 10 kilometres, or even one mile is a task enough to make one's hair stand on end. Yet this is a form of boundary sometimes given. To measure the distance from the feature a road at right angles to it must be cut. In such a case the only course, as far as I can see, is to triangulate carefully the whole district, to fill in the guiding feature as accurately as possible, and then to follow the line, at the given distance from it, as nearly as can be judged, and at any places, where roads appear to cross the frontier, to intersect the position with some fixed point and measure its distance on the map from the feature which gives the line. But this course, though it sounds simple on paper, may be found very difficult on the ground, and some other method may have to be adopted. If there are only one or two points where beacons ought to be erected, it may be possible near each point to measure a short base and to run one or two triangles so as to fix the distance from the feature.

If the feature is to be followed at a very short distance, 500 yards or so, measurement is then not so difficult a matter.

The defects of all these conventional lines are great, and they can only be met by compromise, and by agreeing beforehand how the difficulties, which are sure to be met, are to be dealt with. The line, it will be found, will frequently select the highest peaks, the lowest abysses and the most difficult ground, which the delimiting commission must follow. It will cut through towns and villages, separating families and households, leaving possibly a man on one side of the frontier and his family on the other. Now, although such divisions are not always regarded as an unmixed calamity by the natives, it is rare that the right separation is made, and however much a man may dislike his relatives, they become very dear to him when there is anything, even a grievance, to be made out of them. Too much, of course, must not be made out of the division of towns by boundary lines. In an uncivilised country a town is not the fixture it is in Europe. There, when one builds a house, one expects it to remain more or less in the same position as long as it lasts. In uncivilised land, it is very different. In Africa you never know where a town may turn up next. It is no uncommon thing to find a spot formerly occupied by a town deserted, and on inquiry to be told that the chief has taken his town to some other place. This peculiarity of African towns is a source of frequent errors to cartographers; once they have got a place located, they expect it is going to remain there always, whereas it probably makes several moves. But though the town should be movable, the delimiter's difficulty is not solved. If the boundary cuts it, it may be moved, but to which side? This and other matters must be agreed upon by the com-

missioners before the work is commenced. During my work in West Africa, we agreed that if the line cut a town, leaving the main part on one side and a few huts on the other, the whole town should belong to the side owning the main part. Again it must be agreed if the azimuth line is to be accepted as laid down, or if either commissioner can claim to take observations at any time and to readjust the line by them. In the latter case, the actual line will be a zig-zag one, if it is frequently readjusted, as the observations will probably not agree, if a latitude, within 250 yards, and if a longitude within much more. The best course, I think, is to agree to keep to the azimuth line, and only to test its accuracy and to readjust it at certain points at a considerable distance apart. If each commissioner reserves the right to take observations at any time, very great delay is likely to be occasioned.

There are many other matters depending on the locality to be delimited which it is well to agree about before commencing work. It is better to foresee and provide for all contingencies, so as to avoid every possible source of disagreement.

After the delimitation is ended, or whilst it is going on, a *Procès-verbal* should be drafted. In this document the boundary should be described as carefully as possible, and all roads, rivers, etc., which it cuts should be named. Any arrangements to meet unforeseen contingencies, or compromises, should be described with reasons, as well as the accounts of any discussions on disputed points. To the *Procès-verbal* should be appended a list of beacons, each of which bears a consecutive number, and each of which should be so described that, if removed or thrown down, its position can be recognised again. These documents are drawn up in the two languages of the commission, written in parallel columns and in duplicate, a map being attached to each. Each copy is signed by both commissioners under both the English and the foreign rendering. Both maps are also signed by both commissioners. If the two commissioners are not equally at home in the other's language, it is well that the commissioner who is not well up in his colleague's tongue should draft the original, and that the other commissioner should translate it.

The signing of these documents does not make the boundary, as delimited, valid; the work must be approved by the respective governments. But it is very unlikely that the governments will refuse to confirm the recommendations of their own representatives. In forwarding their report, the commissioners should always recommend that the boundary be accepted as delimited, so that this boundary supersedes that described in the treaty, although naturally it should be identical with it. This point is important, as if this is not done, questions may be raised at any future time as to the position of places, and it may be claimed that some town, etc., is on the wrong side of the frontier, and much trouble may be occasioned. A few years ago a critic thought he had discovered a flaw in the United States-Canada boundary, and wrote to the papers with reference to some place not being in the latitude which it was supposed to be in. But the position of the place made no difference at all, although the boundary is a

parallel of latitude, for it was delimited as being on one side of the parallel; the boundary was accepted as delimited, and therefore no subsequent correction of latitude could remove the place from one side of the boundary to the other.

I have not time to do more than allude to all the many duties which boundary commissioners have to fulfil outside of their delimitation work. In addition to the daily interviewing of native chiefs, and the dealing with local politics, there are other things which require their constant attention. If carrier transport is used, their force must be a large one, and the care and supply of the native establishment will give them much occupation. Their charge is one corresponding to the command of a force in the field, with this difference that, the units not being well disciplined, the Provost-Marshal has an unusually active time. If the country passed through is deserted, much care must be given to establishing depôts in suitable places. It is impossible to carry many days supply owing to the addition that would be made to the mouths to be fed by doing so. It takes at least five men to carry one day's supply for 300.

The work of delimitation, such as I have described, can be undertaken by any officer with a little training and practice. Astronomical observation should be specially suited to artillery officers who have so much training in using instruments of precision, range-finders, position-finders, fire observation instruments, etc., and the computations and theory are easily mastered by any one with an elementary knowledge of mathematics. With regard to topography, I cannot avoid taking this opportunity of impressing on you the importance of learning to sketch on small scales, on scales, that is, of $\frac{1}{100,000}$ or less, or, translated into miles, of from two to four miles to the inch. I am strongly of opinion that for English officers, whose service is mostly in unsurveyed and unexplored countries, all important work, on active service, as well as on boundary commissions, explorations and other expeditions, will be done on these small scales. To sketch on a small scale, an officer's training in the 6″ to a mile line will be of but little benefit to him. In small scale work the main thing to be learned is to exercise self-denial. The officer brought up on the 6″ to a mile line, when let loose in an unknown country, cannot control his feelings and reproduces on paper every little familiar col and watercourse, till he has filled in two or three acres of ground on paper, representing the same number of square miles and has omitted the one mountain or river which should be there. A little practice in working with fixed points will show to the learner how little it is possible to reproduce on paper. The one thing he must look to is to fill in the drainage, and the other main features will then fall into their place. Decimal paper is very useful in this work, as it constantly impresses on the topographer a sense of the relative distances.

I should like to add before closing what I believe is not generally known, that the subjects of practical astronomy and surveying are taught at the Royal Geographical Society in a thoroughly simple and business-like way. Any officer, whether a fellow or not, can obtain in-

struction at a very small cost, and at times to suit his convenience. After passing through a course of instruction in any branch, he can obtain a diploma signed by the President of the Society, and I am sure that if he then reported his qualifications to the War Office, it would greatly increase his chances of employment when occasion arises.

DISCUSSION.

Captain A. H. McMahon, C.I.E.—General Maurice has kindly asked me to say a few words. While carefully following Colonel Trotter's very able lecture I have made a rough note of one or two things which struck me. In the first place he mentioned that there were those present who had seen boundary work under conditions widely differing from those of boundary work like his own. Colonel Trotter's boundary work was, I know, from hearing his interesting lecture at the Royal Geographical Society the other evening, carried out in a country very thickly wooded and with a very moist atmosphere; a country in which, both from atmospheric reasons and from the thick forests, one cannot see to any distance; a country in which there are no very prominent peaks or anything of the kind which facilitate survey work. He also said that in his part of the world they had to do all their work in the dry season and avoid the wet season. On the other hand I had to deal with a country where we longed for a wet season and we never got it, and where our chief difficulty was on account of drought. It was a country where the atmosphere was generally perfectly clear except when it was bleared by mirages. At times, of course, mirages are as great a disadvantage to the work of boundary demarcation as any difficulties due to moisture. We had, however, clearly defined peaks and clearly defined physical features, which facilitate survey work; and our survey work was thus comparatively easy. I am talking of boundary work along the southern frontier of Afghanistan, where it was my fate to have to delimit and demarcate our boundary line. But, before saying anything more about delimitation work there or anywhere else, I will come back to the title of Colonel Trotter's lecture, *i.e.*, "The Science of Frontier Delimitation." I think when one is talking of a science it is not out of place to consider the name of that science. In my opinion, I offer this as a suggestion for what it may be worth, delimitation (which, as we know, is a new word, not to be found in any dictionary, at least not in Webster or Johnson or any classical dictionary) means the laying down—not the laying down on the ground, but the definition on paper, either in words or on a map—of the limits of a country, therefore the boundary, therefore the boundary line of a country. Delimitation covers all the processes and procedure of ascertaining and defining the limits of a country; the negotiations between the governments concerned, and the consideration of tribal possessions, occupation, rights, and everything relating to a country's limits; in fact all the preliminary processes and procedure involved before a boundary is actually laid down on the ground. This, in my opinion, should be properly called delimitation, for the term delimitation covers all this. When all this is done—and it implies a great deal—it implies the settlement of abstract matters such as rights, water rights, grazing rights and many other things that are connected directly or indirectly, with the settlement of an actual frontier line. Having done all that, you then come to work on the ground, and then the process ceases to be delimitation and becomes demarcation. Demarcation, I think, should be held to mean the actual laying out on the ground of the boundary which has been delimited; demarcation is therefore the sequel of delimitation.

With these remarks, going back to Colonel Trotter's lecture, we find that he has divided his lecture into two parts: (1) the things that precede delimitation, and (2), the delimitation itself. According to my view, the first part is delimitation and the second demarcation.

As for delimitation, it can hardly be called a science at all, because we can lay down no fixed or definite laws or rules for delimitation. In delimitation, you have two parties or governments who have between them to decide the boundary; you have every kind and sort of country and all the varying circumstance and conditions of countries, tribes and contracting parties. You can lay down no law which, however well it may apply to the settlement of one boundary, will not be utterly wrong, and put you quite at sea with regard to the settlement of some other boundary. I repeat there are no fixed rules that you can lay down; you are bound down in delimitation work entirely by expediency and necessity, and those two laws are so very vague in their working that you can hardly discuss the varying results of their influence as a science.

There are, however, two obvious rules which should be followed in delimitation work, I might say "must be followed," but in delimitation the word "must" is out of place; the words "wherever possible" should be used instead. These rules are as follows: (1) you should first consider and determine what boundary line you want; it may be a strategic frontier, it may be a tribal boundary, it may be a boundary to include a trade route; in each case the boundary line required is quite different from what it would be in either of the other cases. (2) Having determined what boundary you want, then see that you get it—as I said before, wherever possible. Sometimes it is not possible—the other side will not let you, and then you begin to get into all the real troubles of delimitation. In delimitation it is advisable, wherever possible, to avoid splitting up a tribe. It is advisable, wherever possible, to choose a natural physical feature as a boundary. I agree with Colonel Trotter in thinking that a natural feature is the best boundary, but I do not agree with him in thinking that of natural features a river forms the best boundary. I think, from my general experience in that part of the world, which differs so much from the part where Colonel Trotter was, watersheds form the best of all boundaries; in Afghanistan and along the Indian frontiers generally watersheds are the best. At any rate, let the boundary be a natural feature if you have the choice of it, and do not let it divide a tribe if you can help it. For successful delimitation therefore, a thorough knowledge of the geography, topography and ethnology of the country concerned, is required. Without that knowledge it is unwise to delimitate, except in very general terms. It very seldom happens that such complete knowledge is available, at a distance from the country in question, and the details of delimitation should then be left to commissioners deputed to settle those details in the country itself. Those commissioners, as Colonel Trotter said, ought to be made acquainted with all the negotiations that have preceded and led up to the work they are entrusted with. They should also, as he said, agree among themselves about the scale to work on. I experienced great difficulty from my Afghan colleagues being ignorant of previous negotiations between the Afghan and Indian governments. The first Afghan colleague that I had stated blandly one day that he had no authority to use a scale. I said that he had better get it as quickly as possible; it took him four months to get that authority, involving any amount of inconvenience. Of course he ought to have had authority given him to use a scale; therefore that authority should have been included in the "Instructions for Afghan Boundary Commissioners." At the same time, in my opinion, very few instructions should be given to commissioners. I think they ought to be left as much as possible to their own devices, as any hard and fast instructions are apt to hamper a boundary commissioner

when he gets into a distant part of the country. My Afghan colleague again had on some points no instructions, and on others, very hard and fast ones, and when he had to refer to his government, which was very frequently, it often took a fortnight, sometimes a month, and laterly two months or more to get an answer; and the result was a vexatious delay in delimitation work.

I will now go on, if I may be allowed, to say a few words about demarcation. This, in my opinion, is largely a question of survey work. Delimitation under ideal conditions ought to be so thorough that the commissioners deputed to carry out the results of such delimitation ought to have nothing to do but to demarcate, which means simply laying out the boundary line on the ground by boundary pillars, beacons or in any other similar way. They would thus be simply demarcation commissioners. As a matter of fact, as I have said above, they are more often delimitators as well as demarcators. In all the boundary work I myself have been personally connected with, I have had to delimitate as well as demarcate. In the country where I had to demarcate, I found that where land was not of much value, or there were mountain ranges or other well defined physical features, and where we could see to considerable distances we could put beacons as much as eight and ten miles apart; in other places, where land was valuable, or where there was much disputed land, we had to put them at times within a few hundred yards of each other. What is most important, I think, in demarcation work is that the compass bearings should be taken of the pillars, as Colonel Trotter said. In his case, from the nature of the country, it was very hard to see much from any particular pillar, but in some countries it is possible to do so, and therefore wherever it is possible, careful bearings of each pillar should be taken, not less than two or three; and those should be carefully recorded, together with the height of the pillars, which also is very useful in many cases. I do not mean the height of the actual pillar, but the height above sea level of the site where the pillar was erected. Colonel Trotter talked about demarcating a meridian. I never had any experience of that, but I had a great deal of experience in this last Afghan boundary commission of demarcating a straight line between two points, sometimes varying as much as 80 miles from point to point. We found the best way of doing that was by the heliograph, or rather by the aid of the heliograph; but there again we generally had an open country and a clear atmosphere. We used to fix a heliograph on as far distant a point as we could on the straight line to be demarcated. The course of the straight line was ascertained by the theodolite, and the distant helio brought on to it by aid of heliographic signals. Having got the distant flash into position, we then demarcated up to it by the simple process of aligning flags, to mark the sites of our pillars on to the far flash. Having got there, we checked our position by the theodolite by bearings of the points round and repeated the process. Sometimes a little error was found, but it was easily corrected before proceeding. Of course our progress varied according to circumstances, sometimes there were dust storms, and we could not do any work for days; sometimes we were only able to do a mile or so a day; but that was when circumstances were unfavourable. We found that we could lay down on the ground a straight line to a distance of 60 and 80 miles to any accurately fixed point on a correct map with the greatest accuracy in that way. The Afghan commissioner had a simple method for checking my straight lines which was not altogether unsuccessful. He sent, or rather got me to send, a helio to the far point, marking the end of the line, say 60 or 80 miles away, which of course he could not see, but he nevertheless thought he could from the near end of the straight line. This method greatly assisted my work, for after personally checking my straight line in this manner, he raised no further questions as to its accuracy. On one or two days I discovered that the distant flash had never got into position, and was not therefore

working at all, but the Afghan commissioner saw it, and we got on all right (laughter).

The results of demarcation in the course of the boundary line laid down should be carefully marked on a map, as a map is the most valuable of all records—far more so than any agreements that can be drawn up in words. The map should be as accurate as possible, and the pillars and lines shown with the greatest accuracy on it. The map should be as large as possible. I agree with Colonel Trotter that small scale maps are most useful things, and that those engaged in boundary work are bound to use them; but you should make the map as large as circumstances will allow—from four to two miles to the inch or larger if possible—as large in fact as you can and the boundary line should be put down carefully on it. And, if I may say one thing more in conclusion, careful triangulation should, as Colonel Trotter said, precede all mapping work. This, however, is a province that I will not go into because it is purely survey work, and I am looking, not from point of view a surveyor, but from that of a delimiter and demarcator (applause)

Lieut.-Colonel J. C. Dalton, R.A.—It has never been my privilege to be told off to demarcate a frontier, but I have had something to do when I was in the Intelligence Department with the preliminary part which Captain McMahon rightly, I think, calls the delimitation of a frontier, and I think there is a good deal of responsibility attaching to those, whoever they may be, who have to supply to the demarcator the conditions which he has to follow out. Our custom was that we had first of all to consider every possible view of the question, the various existing maps, all the travellers' routes and so on; we had to compile a map showing the frontiers of the country and get it as accurate as it was possible, to get any map of a country like West Africa where there are no proper trigonometrical surveys. We were then able to submit for the consideration of the Foreign Office or of the Colonial Office what we thought was a fair and proper boundary to be followed, and though we might think we had got a satisfactory boundary and that we had made out a fair case, we had to consider the maps made by the other country concerned, as well as our own, and from their point of view as well as from ours; because, as Colonel Trotter very rightly said, the views of two bordering countries as to the tracing of the frontier may differ very much. If you compare the large French maps of that part of the world with ours, as I remember them some seven years ago, they are very different as regards the position of the countries and towns on the disputed frontier from what we shewed them to be on our maps—each country naturally making the best case for itself. Then, having suggested this boundary, the matter passed from us into other hands altogether to settle as to what line was to be demarcated. Generally speaking, a commission consisting of Foreign or Colonial Office officials on each side (possibly not including a scientific geographer at all) would meet at Paris or Berlin, or wherever the place was and, furnished with the maps supplied by both sides, they would, after some weeks or months of labour, come to a decision and give a line on which they agreed, which would be described in writing and by a rough map. They would then draw up the conditions which were to be handed over to the demarcators. These conditions, when we got them back and saw them, did not always perhaps commend themselves to us as being the best conditions from a geographical point of view, or from the point of view from the surveyor or demarcator. We often found such a condition, as for example, that the line was to be drawn from one point straight to another point. That in itself may be easy to put on paper, but not an easy matter for the demarcator when he gets on to the ground; it may take him across deep valleys and over mountain ranges and all sorts of inaccessible places. We always sought to get geographical features such as Colonel Trotter advocates: a well known river, or

a well defined watershed, and sometimes a parallel of latitude or a meridian of longitude, though these latter are not always very easy to lay down; the responsibility, however, rested with those who made out the conditions in direct communication with the other side; and very often no doubt these commissioners had tremendous difficulties to contend with; and had to fight out vigorously each of these points and each side had to make concessions, the not unfrequent result, I should think, being that the demarcator might be somewhat dismayed when he got to the spot and found where he had to draw his line. Of course it is easy enough to quote rivers and other features and places taken from existing maps, but perhaps they are found not to exist when the time comes; or, if they do exist, they are absolutely different from what they were supposed to be.

There was one point which the modesty of Colonel Trotter made him refrain from giving us as a necessary condition of a frontier demarcator, and that is the natural aptitude of the man who is selected (applause). I should say that such a man must have very great tact, and a good knowledge of the language of his colleague; he must be able to give and take, and keep his temper and meet his colleague half way; he must be a man also of good physique and constitution and temperate habits, who can keep his health in a country such as that traversed by the Anglo-French boundary commission in Sierra Leone. I think, if I may be allowed to say so, that our country was very fortunate in having Colonel Trotter as our demarcator on this occasion (applause). He and I have been companions for nearly the whole of our lives; we were colleagues in the Intelligence Department; and I confess when I saw that he had been selected for this work, though I was very glad that he had the honour, I was a little dismayed and anxious when I heard of the country he was going to; however, he has come out of it I think in, if possible, better health than he went in, and if there is any person here who heard his lecture the other night at the Royal Geographical Society, I am sure they will be able to recognise the great value of the work that he did out there (applause). He has produced a map of the boundary which to me is very interesting, because for years, I may say, I struggled with the topography of that part of the country drawing up all sorts of different positions for these frontier lines in accordance with the varied information which came to hand, and trying to show which countries belonged to us, but which perhaps the French claimed and so on. The positions of the great and little Scarcies rivers, in particular, gave me many weeks of anxious labour and I was quite relieved when I saw Colonel Trotter's map at the Royal Geographical Society, showing that he had definitely fixed all these disputed points, not by compilation, but by actual and exact trigonometrical and astronometrical observations, so that we may rest assured that, thanks to him, we have now a good basis of known positions to work upon, and no doubt the rest of the Sierra Leone district will gradually be mapped in by travellers who will have these accurately fixed points to base their work upon (applause).

REPLY.

Lieut.-Colonel Trotter—I have nothing to say in reply beyond that I agree generally with what Captain McMahon said. I quite accept his ruling as to the meaning of the terms "delimitation" and "demarcation." I think myself I should prefer the term "demarcation" for the work that I did, but I am not responsible for the use of the term "delimitation" it was the term handed down to me when I was told to do the work; I was told to "delimit" the boundary, and not to "demarcate" it, and they expected me to do it on paper.

There is only one other remark of Captain McMahon's that I wish to refer to: he said that a river was not a satisfactory boundary. I have heard other people say the same thing and I did not wish to make a point of that. My point is that it is a satisfactory boundary from the delimiter's or demarcator's point of view, because it gives him no work at all.

The Chairman—Gentlemen, I think there is one thing that must have struck us in listening to the lecture and discussion to-night and that is, that both of those who have taken part in this work of boundary demarcation have certainly not glorified their office; for the one subject, which it seems to me they have omitted to bring before you, is the enormous importance of it, its great extent and variety in every part of the world and the natures and variety of the qualifications required for it. If you consider what delimitation, including demarcation, means: that it means practically the whole of political geography as far as the frontier is concerned; that all the frontiers have to be created by delimitation and demarcation; that it means the end of war and the beginning of peace; that it is the great question on which war or peace usually turns; that it marks what has been gained by the conclusion of the last great war and what will probably be the subject of the next great war; that the Alsace Lorraine question, for instance, is a question of delimitation; that we lost the province of Maine, which ought to be ours beyond all question, by a sheer blunder of demarcation or delimitation or both; that in the near future we shall have an enormously important demarcation, in the case of Venezuela—I think you will recognise what I mean. There is a frontier which you may see now, within a few days' passage of London, marked out by two sets of stones placed on open fields or on common roads. On the one set is the Eagle of the German Empire; on the other, the Eagle of the French Republic. Those stones have been placed by the process of delimitation and demarcation. They are the outcome of the contest of two great nations and represent the struggle both of their arms and of their diplomacy. I think, therefore, that you will see that the subject is one of the largest possible importance. I do not think I should call either delimitation or demarcation a science; I should rather call them arts, but they require the knowledge of a number of other arts and some little science for their proper execution. The frontier between France and Germany, for instance, depended for its delimitation in the first instance upon the arts of war and diplomacy. It might have been very easily blundered in its demarcation without a thorough knowledge of the art of war and without skill in diplomacy. Next comes in the whole question of those sciences which leads up directly to geography and topography and any number of other matters such as knowledge of languages, skill in organisation, the maintenance under very difficult circumstances of discipline and order, and of friendly relations with natives and foreign colleagues or opponents, with the whole art of the traveller in such regions, especially as those of the Niger or the Afghan frontiers, so that quite a variety of qualities are required for it and almost all of them qualities which are more within the grasp of the soldier than of anybody else; so that I think it is work which offers to you a field that is worth your setting before yourselves. It does require and has required the work of all ranks of soldiers. The country that has to delimitate and demarcate does call upon soldiers of all ranks, from the general to the private practically, to do the work. The great frontier of Turkey, after the 1877 war with Russia, was carried out by parties consisting of general officers, colonels, captains and privates, and each of them had their different functions and work to do of the most important character possible. Of course the whole thing originally occupied the attention of diplomatists beforehand and many points were laid down definitely by them; but the whole interpretation of what had been settled by diplomacy, as well as the difficult

question how the change of frontier was likely to affect the warlike position of both parties, had to be determined by the officers engaged in it when they came to the actual geographical position and all the rest of it; for, in my experience, diplomatists very often know little of geography and very often cannot even read the language of maps, and they therefore blunder and make difficulties which, to the soldiers who have to carry out the job, are almost insuperable.

Now Colonel Trotter has told you, gentlemen, how, with the greatest possible ease, you can get over the difficulties of the merely technical demarcation part which Captain McMahon has admirably distinguished from the delimitation part, and I think it is well worth your while to get over those difficulties whilst you are here so that you may be able to apply the common knowledge of the soldier to that other knowledge which it is most useful for a soldier to possess. You will certainly find it well to understand the history of those questions which lead to problems of demarcation; for you cannot possibly have, on any large scale, to deal with war without having to deal to a considerable extent with national politics and diplomacy. Therefore I think we may very gratefully thank Colonel Trotter for his lecture on the subject which he has brought before you (applause). What I have endeavoured to supply is an omission which both his modesty and Captain McMahon's have caused. I have tried to show the extreme importance of the work which they have had to undertake for England and the very high qualities and numerous accomplishments which are required in those who, as they have done, successfully achieve it (loud applause).

DIRECT AND INDIRECT FIRE.

BY

MAJOR J. L. KEIR, R.A.

Before proceeding to a consideration of these two kinds of fire it will be as well to make clear the following :—

(1.) That indirect fire is not advocated as a rival but as an auxiliary to direct fire, only to be employed when attendant circumstances (such as ground, natural or artificial screens, the nature of the fight) render its use clearly advantageous.

(2.) The circumstances under which indirect fire is advocated.

(3.) The kind of indirect fire it is proposed to use and the method proposed for its employment.

Indirect an auxiliary to direct fire

(1.) That in order to gain decisive results you must eventually come to close quarters goes without saying and, when this becomes necessary, all thoughts of personal safety cease. The decisive moment of the action has arrived. It is either win or lose.

Before however close quarters are reached, both attacker and defender will make every possible use of the ground to turn it to their own advantage. The object of the former being to reach decisive ranges with as little loss as possible and with the morale of his troops unimpaired ; that of the latter to delay the attacker's advance and to conceal his own dispositions for defence. So long, therefore, as is compatible with good effect, cover will be utilized by all arms in the earlier stages of the fight and indirect fire will be of importance to the artillery. In the later stages, owing to the general confusion, guns will have many opportunities of advancing to close quarters unobserved and, rapidity and effect being of first importance, direct fire will be the rule.

Such being the general outlines of the attacker's and defender's aims we shall endeavour to foresee how the action of the guns will support them.

When use of indirect advocated

(2.) The circumstances under which indirect fire is advocated.

It will seldom happen that the defender selects a position against which the entire artillery of the attack can be massed under cover within range of him and therefore, the mass from which the preparation for the attack is made will, as a rule, have to be more or less in the open. In a long line, however, certain features of ground will always occur which should be taken advantage of as a means of cover and indirect fire made use of.

And when we consider that the normal frontage allotted to the infantry portion of a Division of our army is about 1 mile and that the Divisional Artillery in line only occupies about 350 yards ; on ordinary ground there should be no difficulty in finding cover for the whole, or a very large portion, within suitable range of the enemy. But when we come to deal with a longer line of guns (15 to 20 batteries), if the line is to be continuous and distances are to be preserved, cover must give way and direct fire only can be used.

Different, however, is the case of the advanced guard batteries, for here cover for one or two batteries only has to be obtained, and reconnaissance of the enemy's position, rather than the pushing home of a determined attack, is the tactical object. The *rôle* of the batteries will, therefore, be to discover the strength and position of the hostile artillery, without allowing themselves to be seriously engaged, until the intentions of the G.O.C. force are known and cover will therefore be utilized when available.

In the same manner rear guards, two of whose main functions are (1) ability to deceive the enemy as to strength and, (2) having done so, to withdraw from their positions with as little loss as possible, will be much better served by guns posted behind cover, where they can show as much or as little of their strength as they wish and who can hold on till the last moment without exposing their teams to destruction, than by those posted in the open and in full view, where the number of guns can be plainly counted and the exact moment of their retirement is unmistakeable.

With how much more effect can all these be carried out if the guns can be brought into position unobserved and their fire only delivered at the moment when the infantry are ready to advance to the attack, or the cavalry to charge and take advantage of the surprise and confusion caused by the opening of the guns from an unknown quarter.

The posting of guns in well concealed positions, aided by natural or artificial screens, where the exact localization of them will greatly enhance the difficulties of the attacker, will, it is contended, be one of the tests of a skilful artillery commander. But in order to turn the situation to the greatest advantage he must have under his command commanders accustomed to rapidly select and occupy advantageous ground and batteries thoroughly trained and practised in the conduct of indirect fire.

Kind of indirect fire

(3.) The kind of indirect fire it is proposed to use and the method proposed for its employment.

In the hand-book of the 12-pr. B.L. two methods are explained under the heading of "Aiming Posts." In one of which only (the second) is the method of bringing the battery into action described. In the description of the first method four cases are named, the first two of which imply that the battery has come into action in full view of the enemy and no mention is made of a method of bringing the battery into action under cover, for the last two (*i.e.* when target can be seen on a limber, or mounted in rear of a gun). In fact, it is evidently intended that the battery should be in action before the aim-

ing posts are used, as the command "stand fast" is the first order given. But even if the battery had been originally brought up under cover its position would soon be indicated by the six men running about 50 yards in front of it to plant their aiming posts as directed.

Now, although considerable accuracy can be obtained by the use of two aiming posts this method is open to many objections and would, as a rule, entail a too great separation of the battery C.O. from his command, unless he trusted entirely to an observer. In short, it is very doubtful whether, as used at present, it would be of much use to Horse or Field Artillery.

The method advocated and described below is a modification of and is based on, that employed on the continent.

Proposed method

The battery C.O. having carefully examined the position and decided exactly where he will place his battery (from under cover), brings it into the covered position in rear. He then falls out the sectional commanders and Nos. 1, and the whole advance until they can just see the object over the crest when mounted. Having pointed it out to them all, he orders them to extend from the flank or centre, keeping well under cover, each taking up a position from which he can just see the object over the crest. When all have done this the C.O. dresses them. The Nos. 1 then turn their horses about, so as to face the battery, which is advanced at a walk (to avoid dust), each gun halting with the leaders heads 6 inches from its No. 1's horse. When all are in position the C.O. orders "Action Front," and the guns are run up to positions of the Nos. 1 (10 or 12 yds.) by hand. The No. 1 of each gun next mounts on to the gun and stands with one foot on each axletree box, directing it on to the object. As soon as he has directed it the layer looking over the sights from the front, directs No. 5 to plant an aiming post in rear of the gun and 2 and 3 mark the wheels.[1] Each section as soon as ready reports to the C.O. who, when he has received all those reports, gives the required elevation and proceeds to range from a position in which he can see the target and observe the effect of his fire.

This method is only advocated at ranges over 1800 yds.

Objections to method

Two objections to the above may be urged (1) Its inaccuracy; (2) the difficulty of obtaining the angle of sight.

We shall now proceed to deal with these objections.

Inaccuracy

(1) Place a man to act as target, in front of a gun, with a feature of ground in between them, so that the man can only be seen from the gun by the No. 1 standing on the axletree seats. Let the gun be carefully directed on to the man and its position fixed in the usual way by a picket in rear. After two or three rounds (in which the gun is run up or back, half a turn of the wheel each time) give "Stand Fast," let the gun be laid on the post in rear and order the man in front of the gun (the target) to place his helmet on the top of a long stick and raise it up so that a layer looking over the sights in the ordinary way can see it. A little practice will prove that very fair accuracy for direction can be obtained by this method, elevation being given by clinometer. For

[1] N.B. Wooden stops with an iron pin are very useful for this purpose, and add much to the accuracy of fire.

the following reasons great accuracy of direction is not considered necessary. The modern targets for artillery are (1) Artillery in action, (2) Infantry in long thin lines. In the former case, long distance, or artificial concealment, will very frequently preclude fire upon single guns. In the latter a slight lateral deviation is of small importance, elevation being the chief desideratum. Cavalry will be dealt with under the head of moving targets later on.

Angle of sight

(2.) As a rule this would be small and the actual range would be given by the range-finders. Thus suppose the range by clinometer elevation was found to be 4° 30′ and the range-finders gave 2,500 yards, (3° 5′), as the range. The trial fuze would be bored at 12½ (Mark II carriage). The angle of sight in this case being + 40′ or 4° 30′—3° 50′. Supposing no range-finders available, the angle of sight must be judged, or taken by a pocket level. Practice, however, would soon remove this difficulty.

Objections to fire from behind cover

It is now proposed to deal with the main objections which have been made to an extensive use of fire from behind cover. They are as follows :—

(1.) It is very rare to find ground where you can carry on practice with more than a single battery.
(2.) That you cannot change your target without making elaborate preparations.
(3.) That you cannot concentrate your fire.
(4.) That you cannot fire on moving targets at all.
(5.) The ground of moral effect, viz., that an extensive use of cover will make our artillery slow in advancing to the support of the infantry attack.

Objection 1 —ground

That it is rare to find ground where you can carry on practice from behind cover with more than a single battery in the parts of England, in which military operations are allowed to take place, is admitted. But the great battle-fields of 1870, which may be taken as an average sample of continental country, show ground where large numbers of guns could be fought from behind cover and were our own manœuvres not confined to certain localities, such ground is common enough at home. It may also be taken for granted that the sites of battles are but rarely to be found on level plains where cover for one or both sides is not plentiful. Considering then the enormous extent of modern battle-fields, with their great variety of choice of artillery positions, this objection can hardly be upheld; although it may sometimes become a question whether it will not be advantageous to decrease the interval between guns, in order to obtain concealment for a greater number.

Objection 2 —changes of target

This is, no doubt, a serious disadvantage on the practice ground, where changes of target are of necessity frequent and no enemy has to be considered; but on the battle-field where your action is to a great extent dependent on the adversary with whom you are engaged it would, even if the case, be much less felt. Are elaborate arrangements however necessary ?

Let us first consider broadly when changes of target would probably be found necessary.

In the attack, the defensive position of the enemy having been reconnoitred and his advanced troops driven back on it, the preparation for the infantry attack is proceeded with and few changes of target are necessary, until the advance of the infantry attack masks the guns, which must then advance to a closer range to support it. At this stage, the defender's attention being fully occupied, opportunities for the guns to advance may be expected to be frequent and rapidity of movement and prompt support to the weaker portions of the line of attack will be all important; and here it is hardly necessary to observe the direct method only, except in very exceptional circumstances, will be possible, or indeed advisable.

In the defence, the guns will be so posted as to command the avenues of approach and one great object of the defender being to conceal the position of his batteries, cover whenever practicable will be made use of. As the attacker advances changes of target will certainly be necessary; but not frequent. In this respect manœuvres are most misleading, as the time necessary for the guns to accomplish their object is seldom allowed for and the advance of the attack is rapid and uninterrupted. The duration of battles prove that this is not the case in practice.

The question of cavalry attacks upon guns has not been taken into account, as it is contended that the opportunities for this arm will, as a rule, occur in the later stages of the fight when direct fire is employed.

When two aiming posts are used the arrangements for making a change of target may be considered elaborate; not so however, we venture to think, when only one is made use of. All that is required in the latter case being for the No. 1 to mount on the carriage and re-direct the gun while the layer re-adjusts the back post. By this method the same latitude of field of fire is open to a battery using aiming posts and forming one of a number in a line of guns, as to a battery using the direct method; for neither can make a change of front without impeding the fire of the batteries on either or both sides of it.

Objection 3—concentration

Concentration is a comparative term. A battery, for instance, might concentrate on a particular gun or section of another battery; a brigade division on a particular battery; the artillery of an army corps on a particular locality (village, wood, etc). In none of these cases is the difficulty much greater when using the method of indirect fire advocated than when firing direct; especially when we consider that smoke, rain, haze or snow may compel a change from the tangent or Scott sight to the clinometer and aiming posts. But will concentration on particular guns or batteries be very easy?

Judging from the latest reports from the continent, the Germans, at any rate, do not intend to expose their guns, unless obliged to do so. In support of which view I quote from a letter sent to me by an officer who attended their manœuvres last autumn, in which he says:—

"The artillery always obtained cover from view when coming into action; if possible behind bushes and fir trees, but otherwise on the reverse slopes of the hills. I constantly saw the guns run up 120 yards

with drag-ropes. The slopes were very gentle and laying with clinometer and aiming posts was constantly resorted to. The country was an open heath and not in general favourable for artillery. I saw a division and the army corps attack a masked enemy and on each occasion the guns were massed on the flank from which the infantry commenced the turning movement. They never changed position, the range being about 2500 yards. When the attack was imminent a heavy fire was poured on the reserves."

They also make use of a disappearing target for the purpose of training their layers to lay quickly on the flash of guns, whose exact position is only visible when firing.

Two translations have recently appeared in the "Proceedings." One, "New Russian regulations regarding the tactical and fire discipline of the brigade division," by Lieutenant H. W. Taylor, R.H.A.; the other, "Ammunition supply in the field" ("Russian Artillery Journal") by Major E. A. Lambart, R.A. In the former of these the following passages occur:—

(17.) It is now-a-days most important, not only to make the reconnaissance of the first position under cover, but to advance under cover and eventually place the batteries on covered positions. The assailant must neglect nothing which may further increase the advantages inherent to the defenders, a delay in opening fire resulting from caution cannot be weighed in the balance with the evils resulting from coming precipitously into action.

Particular attention must be paid to the following points:—

(1.) Advancing the batteries, each one in formation and to the point most likely to keep it under cover, not hesitating for this purpose to make necessary détours.

* * * * * * * * * *

(24.) As far as the ground will allow, guns are run back by hand before limbering up, so as to conceal this operation as far as possible from the enemy.

Turning to the second one we read:—

"The power of firing from behind crests of hills—a result of improved *matériel*—will oblige both sides to take advantage of cover and the zone of ground it will be necessary to search with fire may be very deep, so that to produce the same effect a much larger number of rounds will be required than might be inferred from practice made against visible targets on the practice ground.

This heavy expenditure of ammunition will take place at the very beginning of a battle and in a very short time. It is true that four or five well ranged rounds may disable an enemy's battery, but to arrive at these ranged rounds it may be necessary to fire 20 or 30 rounds if the enemy has taken proper advantage of cover.

* * * * * * * * * *

The large increase in the number of entrenching tools carried has given also increased facility to the infantry in taking cover and the power of shrapnel against even slight entrenchments has not increased

much since 1870. Troops of all arms moreover have gained great skill in taking advantage of cover."

The conclusion to be arrived at from the foregoing seems to be, that concentration of fire on particular portions of an enemy's line of guns, however desirable, will in future be attended by much greater difficulties than formerly.

Objection 4 —moving targets

Before explaining the method proposed to adopt in firing at moving targets from behind cover, we shall start with the following postulates:—

(1.) Against rapidly (faster than trot) moving cavalry, little effect is produced at long or medium ranges by the regulation method of ranging and it is better to trust to magazine fire and case at close ranges to repel an attack of this kind.

(2.) The consideration of compact bodies of troops moving across the front of a position, in full view and at a uniform pace, is almost unnecessary with the present formations of infantry; and therefore, this description of moving target will not have to be dealt with.

(3.) The normal moving targets (omitting cavalry dealt with in 1.) of the present time are:—

(*a.*) Lines of infantry in rank entire, extending over the whole front, which do not make a continuous advance in one line, but by a series of rapid independent advances of numerous small bodies endeavour to establish themselves in a thick firing line, at from 500 to 600 yards of the position to be assaulted.

(*b.*) Batteries or Brigade Divisions, rapidly advancing direct on the position attacked against which better results would, as a rule, be obtained by attacking them at the moment they are coming into action and before they can range, than by treating them as moving targets.

(4.) The regulation method assumes that the attacker will advance over a level plain and be visible during the whole advance. This will, it is contended, be the exception, not the rule.

To sum up in one general creed. The moving target, though most useful as an exercise at the practice camp, will rarely be able to be practised in its entirety on the manœuvre ground.

Having had opportunities of hearing the opinions of officers of other branches of the service on witnessing our practice at moving targets, supposed to represent cavalry and infantry, it must be confessed that they were anything but flattering to the imaginary leaders of their respective arms with regard to their methods of attacking our batteries.

We are often so pleased with the doings of our own particular arm that we are inclined to forget the saying of a great General, that in the consideration of an enemy's probable movements we should always give him credit for doing something sensible. Will cavalry attack a well posted and otherwise unmolested battery over a mile of clear and open ground, by a purely frontal attack, after having given it time to pick up the range? The exercise is a useful one for our practice grounds. To hope for such chances in war, in anything but very exceptional circumstances, from an arm whose first teaching is to

await favourable opportunities and seize them with suddenness and rapidity is to place too much reliance on the indifferent handling of our opponent's forces.

Should, however, these views not be accepted, it is proposed to demonstrate that the moving target as practised by direct fire on the practice ground can be also performed from under cover.

The chief difficulties in our path are (1) the angle of sight (in this case a constant as we are treating an advance over a level plain) (2) the management of rapid variations of fuze.

This can be found in three ways:—

(1.) By the range-finder (*i.e.* difference between clinometer elevation and elevation due to range in degrees and minutes).

(2.) By means of an Abney's level or other instrument.

(3.) Judged approximately by constant practice. As we are at present dealing with a level plain (the sands at Shoeburyness for instance) the angle of sight need not be considered.

Taking the 12-pr. gun with Mark II. carriage the following rule for finding the length of fuze required for a certain elevation will be found near enough.

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To the lay mind the solution of the cover question seems quite simple. "You will, of course, train your men in peace to do without cover. In war time they will find it soon enough of their own accord." Objection 5—moral effect

Were the operation of posting guns behind cover as simple as it sounds, this reply would be quite satisfactory, but as the art of selecting suitable covered positions and quickly placing batteries in them, requires great experience and the science of successful gunnery from behind cover much practice, the solution is, we hold, anything but satisfactory.

We are not afraid to teach our infantry to shoot with rifles for fear, lest, when the time to charge with the bayonet came, they should remain behind under cover. Their officers, having decided the opportune moment to advance, issue their orders and the charge is carried out. Are not our officers capable of deciding when cover should be used and when it should not be used, when to advance and when to remain behind cover?

Moreover, of all arms the one least liable to panic and moral effect is the artillery; not from any superiority in gunners, but from the fact that guns once in action cannot be moved without an advance on the part of the limbers, whereas the tendency in case of panic would be in the other direction. The guns must remain and the only chance for the gunners is to remain with them.

Similarly in advancing, a man, or even a man and a horse, left to their own devices may turn tail; when, however, you have a clump of five men and six horses inseparably connected and all under the eye of a N.C.O., whatever backward inclination one or two of them may have, the majority will carry them forward. This being so artillery is more in hand and easier to control than either cavalry or infantry. Why then should its commanders not be allowed the same privileges as those of the other arms?

Much as we may despise cover and prefer a bold offensive, is there not a chance that by over encouragement of direct fire we may run the risk of suffering great losses at the outset of a campaign and so seriously impairing that morale which we are so anxious to preserve. Important as it is for guns to be well forward, the artillery is only an auxiliary arm whose most important duty is to render the greatest assistance possible to the infantry, who can alone win battles. This would appear to be best achieved by a skilful use of the arm at the longer ranges, so as to ensure its co-operation at the decisive ones.

At manœuvres it is not possible to carry out with any approach to reality the final phases of a battle and the fact that, when two forces are closely engaged opportunities for the advance of guns to close range must occur, cannot be allowed for. Their action, however, during the opening phases of a battle can be foreseen with much greater certainty and practised accordingly.

Excellent as is the experience of the practice ground, the absence of the other arms and the very limited field of its operations render its tactical teachings often misleading. It is to the manœuvre ground that we must look for our most valuable lessons, where we take our place

with the other arms and can study their methods in full view, not in imagination.

To sum up, then, the above objections are met as follows :—

(1.) Taking a large extent of average country and not restricting ourselves to a few limited localities, it is not admitted that it is very rare to find ground where you can carry on practice with more than a single battery. The difficulty caused by the necessity of hitting the 'butt' at practice very much narrows the already limited number of positions and it seems often to be forgotten that whereas great care has to be taken to avoid damage by stray shots in peace, these are of no account in time of war.

(2.) With practice, changes of target can be made as rapidly from behind cover as by the direct method. With regard to the frequency of these changes, the impressions of the practice ground tend to exaggerate the requirements of actual warfare.

(3.) If by concentration is meant the focussing of the fire of a number of guns on a target a few yards wide, indirect fire certainly falls short in accuracy compared with direct, but as such a concentration is only possible for a very limited number of guns, it is maintained that concentration of fire for practical purposes is as attainable by indirect as by direct fire. The facility of concentration of fire is moreover over estimated owing to the necessary visibility given to the targets used for instructional purposes.

(4.) The conditions under which the practice of firing on moving targets is at present carried out presurposes a much too favourable position for the artillery. The method is rarely or ever employed by single batteries even at manœuvres. It is never practised by units larger than batteries at all; and beyond a useful exercise at practice camps, it is of little real value. But even if its ability be granted, with practice and ingenuity the service system could be adapted so as to render its employment under certain conditions by guns behind cover, or partial cover, almost as effective.

To avoid misunderstanding the above remarks are in no way intended to reflect on our present excellent system of training, but to raise the question, whether the deductions of the practice camp, rather than those of the manœuvre ground, are to be taken as a guide in the solution of questions of artillery tactics similar to the one now under consideration.

(5.) If it is to be arbitrarily decided that direct fire, and no other, is to be used it is maintained we shall lose in efficiency and relieve battery commanders from incurring the responsibility of making use of favourable opportunities for placing their commands in concealed positions and fire from behind cover will never be attempted; whereas a modification which allows and encourages, a choice of the nature of fire to be made use of, will tend to a solution of the question, when cover should be used and when it should not. Unless however, the effect of fire with the clinometer from behind cover is tested in comparison with direct fire, no confidence in its use will be established.

There is one other point of view from which this question should be regarded *viz.*, that of savage and semi-savage warfare. In this, experience of the tactics of the enemy can alone decide the action of the guns, and no form of procedure can be even outlined to suit every case. Their artillery, if any, will be vastly inferior to our own. Effect is first and the rest nowhere.

No special reference has been made to smokeless powder as its use is taken as a matter of course.

The chief points then we venture to submit for consideration are :—

(1.) The increased importance of cover and indirect fire for guns demand more frequent practice in taking up positions behind cover and concealment from view of the enemy.

(2.) The study of methods of attack of positions on which the positions of guns will not be clearly indicated.

(3.) A solution of the questions whether the fire of guns laid from above the gun, with one aiming post behind, is sufficiently accurate, or whether two aiming posts must always be employed.

(4.) The issue of clear and detailed instructions for a uniform method of the occupation of positions behind cover, so as to disclose the positure of the guns as little as possible and to settle to what extent it will be necessary to run up guns into position by hand in order to avoid casualties among the horses.

During the last 10 years our artillery have passed through several vicissitudes with regard to the best method of coming into action. It commenced with the direct method with no method, followed by the deliberate method with too much method and practically used on all occasions and at all ranges and ended with the present excellent combination of the direct and deliberate methods. To this it is hoped will in time be added a suitable method of coming into action and opening fire in such a manner as to conceal the movement *entirely* from the enemy.

Lastly, one thing above all must be remembered—the greatest enemies to the supporters of cover are those who would subordinate effect to cover on all occasions.

ENCAMPMENTS IN HILL WARFARE ON THE N.W. FRONTIER OF INDIA.

BY

CAPTAIN O. C. WILLIAMSON, R.A.

The peculiarity of the above form of warfare is liability to night-attack and also by day the unpleasant danger of some seemingly harmless hill man suddenly producing a long knife and digging some one in the ribs. The latter danger does not affect the campaign, but a successful night-attack by the enemy would never do.

I attach a map and explanatory appendix of a method of encampment which stood the test of adaptability to all shapes of camping grounds in a recent campaign. The main ideas are old ones, viz., the necessity in case of sudden attack for the line of resistance to be occupied in the shortest space of time and the advisability of having a fairly solid obstacle between a sleeping force and an enemy that starts up from seemingly nowhere, cares nothing for outlying picquets and seeks nothing but victory—or paradise at the nearest rifle muzzle. We know laagers and zeribas: the form of encampment now dealt with is of the same genus.

All of us have probably seen a brigade camping, the dressing of the various streets and of the front of the camp, the galloping to and fro, the shouting of the Captains, the waiting of the troops till their location is fixed, the hopeless jam of baggage on the road in rear, the orders and counter orders. But we must agree that the result is worthy of the pains taken; row on row of tents in perfect dressing; everything smart and in its right place. However, from the point of view of the warfare to which this article refers a serious defect exists in the form of camp that an army operating in civilized lands finds suitable. Alarm posts are necessary, often far from the sleeping posts of the soldiers and until these alarm posts are occupied the flanks and rear of the camp are absolutely exposed. The method evolved in Waziristan, after the action at Wano, gives therefore a solution of the problem which seems worthy of publication.

The main ideas of this method of encampment are: the occupation of the perimeter of the camp by the sleeping places of those who form the lines of resistance and the alignment of the camp on the centre or main street of the camp, instead of the front of the camp being the alignment from which all distances are taken.

The object of the occupation of the perimeter is obvious, details will be gone into later.

As regards the question of alignment it will be noted that camps may have to be pitched in irregular ground, say in a winding meadow, never 100 yards wide and of unlimited length, or say in terraces on a hillside or in any irregularly shaped ground.

The task before the staff officer is to get his troops each on their own bit of ground without delay; to use all the good ground, avoiding the bad and to so arrange matters that no baggage animals of one corps should cross and foul the ground to be occupied by another corps. First he rides all over the ground. He will be able to note its greatest length. By the method proposed, instead of dressing a line of camp fronts and so perhaps not utilizing valuable outlying camping space, he simply places himself at any point of the centre line of the proposed camping ground and his assistants measure the length of the centre line of the camp. He then goes to one end of this centre line and each corps' representative, *i.e.*, quartermaster or quartermaster-sergeant measures in succession along the centre line the amount of distance his corps occupies in what may be called the "normal" camping formation—*see* map. This being done the various quartermasters' assistants spread right and left from the centre line of the camp taking again their "normal" distances and being dressed on the perimeter of the "normal" rectangle by the staff officer's assistants. Each quartermaster then examines his portion of camp and reports all correct; or that his depth is insufficient; or that a certain portion is not possible to camp on; or as the case may be. The staff officer has to consider each case on its merits; such as permitting the camp perimeter to become irregular and increasing the size of any particular camp.

In the case where the length of the centre line is shorter than "normal," instructions must be given to each quartermaster to proportionately reduce his "normal" distance on the centre line and of course where possible this "normal" area of the camp is increased by a proportionate expansion right and left from the centre line of the camp.

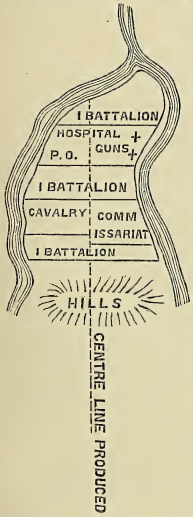
The areas having been settled, each corps goes ahead marking out its camp and pitching its tents independently of any other corps, since in the "normal" rectangular camp, the tents naturally cover off along the perimeter line while in oval or irregular shaped camps covering off is not possible. The corps quartermaster having marked out his camp his corps enters into possession and in due time their baggage arrives and is led into camp. Both in a corps marching on its camp and on the arrival of the baggage, care must be taken by both itself and other corps that no portion of any corps' camp is crossed. This requires some energetic action occasionally, but where the ground occupied is not the whole of the practical ground available, all corps and baggage can get round to their own camp outside other camps; while if the ground is not available, the centre road can be made the means of communication. The latter method out of the difficulty should be avoided if possible, as animals tend to straggle and the camp suffers and I would advise the centre road remaining sacred, except when opened to baggage and troops by the orders of the staff officer.

The camps being marked out, baggage up and tents pitched, we have a wall of tents as an obstacle and inside them men sleeping on their alarm posts. To give them a line to fall in on it was generally

customary for a stone wall or an entrenchment some 2 feet high to be dug some yards outside the tents. If time allowed this wall or entrenchment was increased into an obstacle and breastwork: or more generally was supplemented by an abattis of thorn bushes.

The centre road and cross roads supplied communications and the various guard tents watched the passages by which any suspicious character might attempt to get into camp. In-lying picquets were proportionately supplied by regiments with adequate regimental arrangements for occupying their portion of the perimeter should they be called away to reinforce the threatened point. The artillery usually had a section told off for this duty of in-lying picquet. The outside picquets and out-posts concentrated at a few points and varied very much in strength from day to day. Each corps was told how many men it would supply for this duty early in the day so as to arrange its perimeter line of defence accordingly.

This perimeter line of defence required some adjustment; as though the "normal" distance between tents was usually adhered to, still at any moment a corps might be asked to supply a further strength for picquet, in which case its tents would have to be more spread apart to occupy the ground or at times a picquet might be withdrawn, when a portion of the perimeter line of tents already measured and marked out might have to be doubled.



The great advantages of this formation of camp and what I will call the "centre line" method of alignment are its flexibility and adaptability to all natures of ground; the centre line may even be a zigzag but this is a rarity. Each corps rapidly used to "peg out" its portion and the staff officer having the centre line as a "constant" can adjust any difficulties caused by scarcity of ground either in any individual camp or in the camp as a whole very much more rapidly than when he works from a frontal alignment. As regards principles involved; zeribas and laagers are accepted as orthodox and the form of encampment herein advocated is simply another form of the same defensive tactics.

Strength of Brigade:—

1 Mountain Battery, 1 Squadron Cavalry, 3 Battalions (600 men each, of which 4 companies are out of camp on out-post duties) and various detachments.

APPENDIX.

Explanation of Figures in Plan.

Three battalions of infantry are marked respectively "*A*" "*C*" "*E*." It will be noted that "*A*" and "*E*" are pitched on the same principle, but that owing to "*E*" having a greater number of men absent on

picquet duty the area of "*E*" camp is the smaller.

"*C*" as a centre battalion has no flanks to defend and the men in tents marked "*B*" and "*D*" to protect hospital, post and telegraph office and commissariat are therefore furnished from "*C*".

"*K*" Commissariat offices, &c.

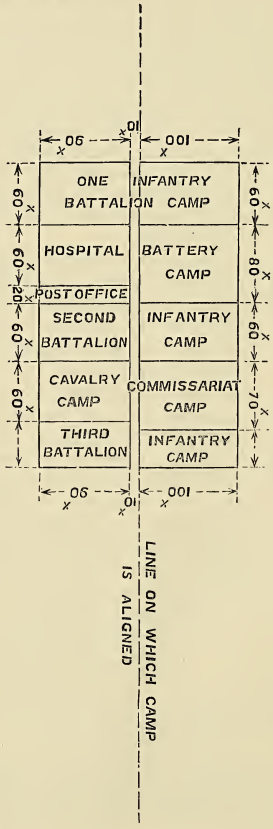
"*L*" Guard tents.

"*F*" Followers tents, muleteers, grasscutters, &c., &c.

"*G*" Cavalry troopers tents, native cavalry pattern.

"*S*" Subalterns' or company officers' tents.

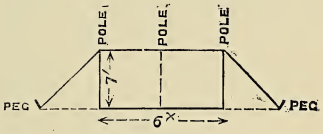
Small plan giving camps only.—



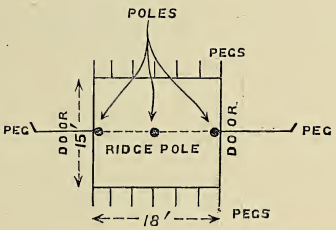
This represents Indian general service tent of 160 **pounds or 1 mule** load, holds 20 British or native soldiers or 24 followers.

FRONTAL ELEVATION.

SIDE ELEVATION.



PLAN.



It will be seen that such a line of tents pitched about 5 yards from the entrenchment and with the side elevation presented to the attack *i.e.*, with ridge poles parallel to the line of entrenchment are in themselves a good obstacle, while the doors permit egress equally well right and left.

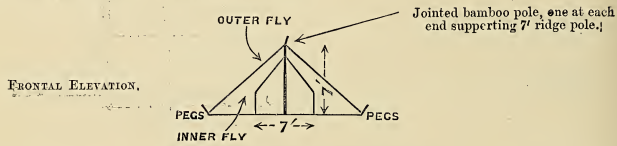
This represents Indian general service tent of 80 pounds, similar to above; but with ridge pole only half the length and with only 2

jointed poles to support the ridge pole. An excellent tent for a battery

mess in temperate weather, when really severe marching is expected and transport is scanty. Will seat 7 at a pinch.

This represents officers 80lb. double fly (double roofed) tent 7′ by 7′ in plan. Some are made somewhat lighter. Each British officer

is entitled to 80lb. weight of tentage and 70lb. weight of personal baggage, but many prefer in the first rush of a campaign to double up two in a tent so as to get more baggage in and as the allowance for each servant (native), 10lbs is not anywhere nearly sufficient, this plan enables sufficient to be be carried for the faithful retainer. In Mountain batteries however and I think in all Royal Artillery Batteries the 80lb. tent per officer is usually carried.



This represents mules picketed. Mules are picketed by means of leather loops attached to chains 3 feet long, each mule is picketed by

a fore-foot and a hind-foot. The fore-foot chain is attached to an iron peg, the hind-foot chain is attached to a cotton picketing 2″ rope led back to the hind picketing peg, also an iron peg. In these camps it was found necessary to close the mules up as much as possible and the dimensions were :—

(1.) Down the centre line of heads, 2 yards, mules do not bite much and soon get very tame about the heads if treated kindly and not seized suddenly by the headstall.

(2.) For each mule, 1½ yards for gun mules, 1 yard for transport mules. This seems very little but was found ample and nasty patches of rock, stumps of trees, &c., could then be avoided by means of the margin of space gained.

30
A
Mooi River
A
L
IETERMAR
ITZBURG
Inchanga
DUR
30
DURBAN 22 HOURS 260 MILES
32
34

CAPE GOVERNMENT RAILWAYS.

MAP OF THE ROUTES

TO THE

GOLD FIELDS.

Cape Government Railways and Telegraphs and lines over which the Cape Government has running powers ——

Cape Government Railways ..... *under construction* ——

Other Railways ..... *open* ——

„ „ „ ..... *under construction or authorized* ——

Northern Trade Route. (Coach & Waggon) ——

MINERALS DENOTED AS UNDER

Gold
Copper
Lead
Coal
Iron
Asbestos
Crocidolite
Diamonds

Scale of English Miles.

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300

Long. E. from Greenwich.

Compiled in Engr's in Chf. Dept

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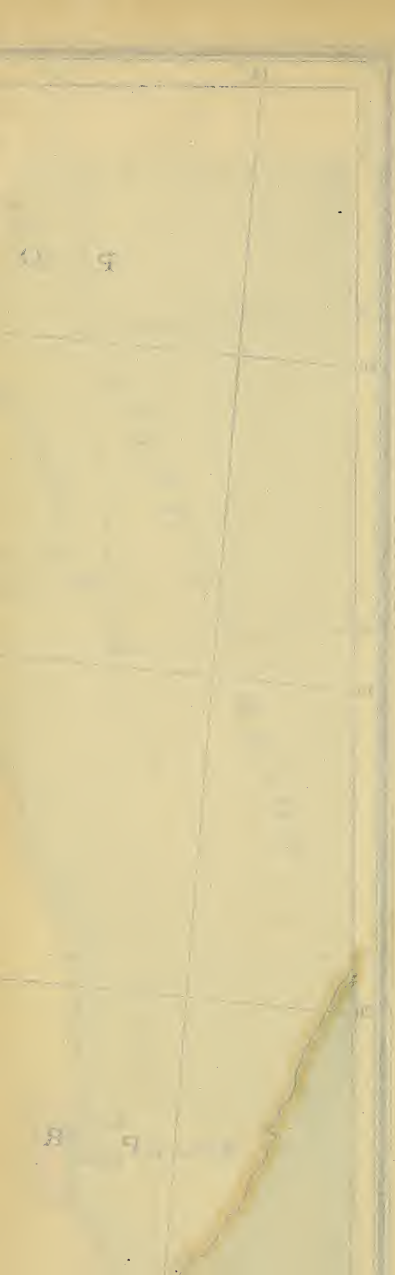

Signes conventionnels
indiquant les positions des troupes
au mois de Juin 1855.

Français.
Anglais.
Turcs.
Piémontais.

Nota. *Les positions indiquées sur les Monts Fedoukhine correspondent au 16 Août 1854, jour de la bataille de Traktir*

CRIMEAN WAR.

1854.—War having been declared against Russia by England and France 28th March, 1854, troops were sent to the East which, after remaining some time at Gallipoli and other places, sailed for Varna where they disembarked 29th May. The allied British, French, and Turkish forces, amounting to 58,000 men (25,000 British), commanded by Lord Raglan and Marshal St. Arnaud, sailed from Varna, 3rd September, and landed on the 14th, 15th, and 16th, without opposition, at Old Fort, near Eupatoria, about 50 miles from Sebastopol. On the 20th they attacked the Russians, between 40,000 and 50,000 strong (under Prince Menschikoff), entrenched on the heights of Alma, supposed to be unassailable.

26th Sept.—Allies occupied Balaklava 26th Sept.
29th ,, Death of Marshall St. Arnaud.
17th Oct.—Siege of Sebastopol commenced—grand attack (without success).
25th ,, Battle of Balaklava—charge of the Light Cavalry, with severe loss. Charge of Heavy Cavalry,—a success.
26th ,, Sortie from Sebastopol repulsed by Generals Evans and Bosquet.
5th Nov.—Russian attack at Inkerman, defeated.
14-16 ,, Great tempest in the Black Sea, loss of the "Prince" and store vessels.
20th Dec.—Russian sortie.

1855.

26th Jan.—Sardinia joined England and France.
Jan. & Feb.—Great sufferings in the camp from cold and sickness.
17th Feb.—Russians defeated by the Turks at Eupatoria.
22nd Mar.—Sortie from the Malakhoff tower.
19th Apr.—Capture of Russian rifle-pits.
8th May.—Arrival of Sardinian contingent.
22-24 ,, Desperate night combats.
24th May, 3rd June.—Destruction of Kertch, and large amount of stores.
3rd June.—Taganrog bombarded.
6-7 ,, The White Works and Mamelon Vert taken.
18th ,, Unsuccessful attack on the Malakhoff tower and Redan.
28th ,, Death of Lord Raglan, succeeded by General Simpson.
16th Aug.—Defeat of the Russians at the Tchernaya.
18th ,, Ambuscade on the glacis of the Malakhoff taken. Russian sortie repulsed.
8th Sept.—The French took the Malakhoff by assault; the English assaulted the Redan without success; the Russians retired from Sebastopol to the North Forts, and the allies entered the city; the Russians destroyed or sunk the remainder of their fleet.
17th Oct.—Kinburn taken.
18th ,, Russians blew up Oczakoff.
6th Nov.—Defeat of the Russians, and passage of the Ingoul by the Turks under Omar Pacha.
14th ,, Sir Wm. Codrington took the command in room of General Simpson.

1856.

2nd Jan.—Centre dock at Sebastopol blown up by the English.
1st Feb.—Destruction of Sebastopol Docks.
30th Mar.—Treaty of Peace concluded at Paris.

The English lost: killed in action and died of wounds about 3,500: died of cholera 4,244: of other disease nearly 16,000: total loss nearly 24,000 (including 270 officers) 2,873 were disabled. The war added to the National Debt £41,041,000. The French lost about 63,500 men: the Russians about half a million of men.

Lille is on the Map

M A N C H E
L A
S O M M E
SEINE INFR.
Rouen
Beauvais
Laon
Rheims
Meaux
Versailles
Chalons
Bar le Duc
Epernay
Epinal
Colmar
Schelestadt
Chartres
Troyes
Chaumont
Vesoul
Orleans
Blois
Tours
Dijon
Besançon
Berne
Nevers
Bourges
Moulins
Macon
Genevy
Fort de l'Ecluse
Mont Blanc
Grenoble
Valence
Turin
Pignerol
Fenestrelle
Plaisance
Gênes
Privas
Gap
Digne
Antibes
Nice
Aix
Arles
Avignon
Apt
Draguignan
Toulon
Montpellier
Toulouse
Cahors
Rhodez
Agen
Auriliac
Perigueux
Bordeaux
Bayonne
Pau
Tarbes
Mont de Marsan
Carcassone
Perpignan
Foix
Saintes
Fontenay
Niort
Poitiers
Guerret
Limoges
Clermont
Puy de Dome
Mont Brison
Lyon
Roche Chouart
Angoulesme
Brest
S. Brieux
Quimper
Vannes
Rennes
Lorient
Nantes
Laval
le Mans
Belleisle
Ile d'Oleron
Ile de Rhé
Ile d'Aix
Ile d'Yeu
Ile de Noirmoutier
Ile de Groix
Ile de Ré
Ile d'Oleron
Ile de Belle
Ile d'Ouessant
Ile de Sein
Ile de Batz
Ile de Bas
Ile de Rhuis
Ile de Molene
Ile de

Col. Wellesley
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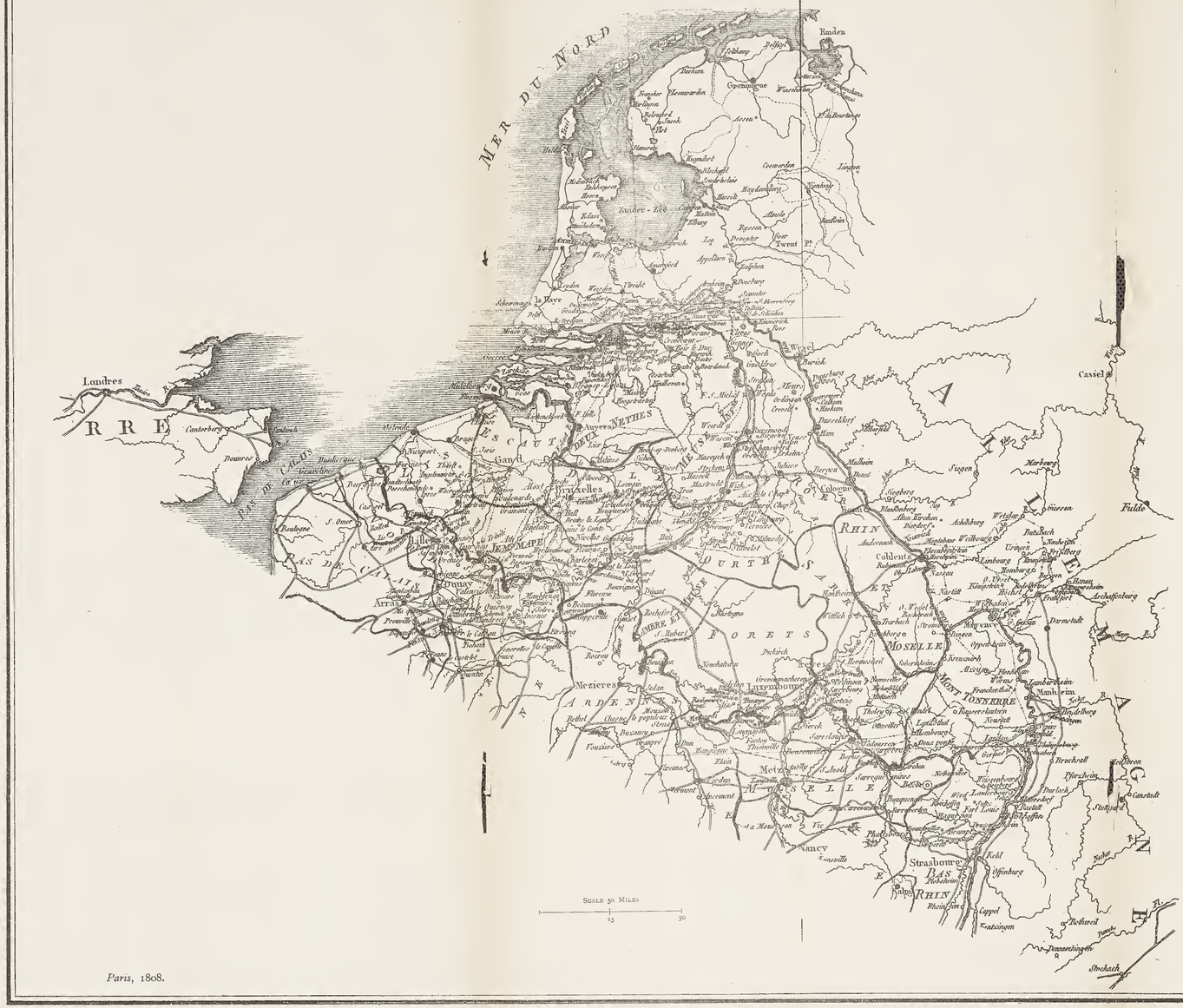

Paris, 1808.

BELGIUM & HOLLAND.

1578.—English defeated Don John of Austria at Rymenant.

1585.—7,000 English entered Holland.

1586.—Zutphen.

1587.—Heroic defence of Sluys by Sir R. William—June—August.

1588.—Grimston's defence of Bergen op Zoom.

1672.—6,000 British under Monmouth serve under Turenne against the Dutch.

1673.—Siege of Maestricht.

1677.—10,000 English to help Dutch go to Nieuport.

1678.—Defeat Luxembourg at Mons.

1689.—Walcourt. Marlborough distinguished.

1691.—Large British force near Brussels.

1692.—Battle of Steenkirk—splendid bravery of Mackay's Division of Guards and Royal Scots.

1693.—Landen; Scots, Queen's and 6th Dragoon Guards distinguished—William III. defeated by Luxembourg.

1695.—Namur captured by William III.—intrepidity of our Guards.

1697.—Defence of Brussels.

1702.—Venloo Roermond, Liege taken by Marlborough.

1703.—Marlborough took Huy.

1705.—Marlborough forced Villeroi's lines at Tirlemont.

1706.—Ramillies.

1706.—Brussels, Malines, Ghent, Bruges, Antwerp and Ostend taken.

1708.—Oudenarde.

1708.—Convoy action of Wynendale—Webb's victory, one of the finest convoy actions in history.

1709.—Tournay taken.

1709.—Malplaquet, (the severest battle till Eylau 1807).

1709.—Mons taken.

1709.—Douai taken.

1711.—"Ne plus Ultra" lines carried—Bouchain taken.

1745.—Fontenoy—42nd Highlanders and great British Infantry column under Cumberland, "finest Infantry action under desperate conditions in the 18th century." Irish Brigade—Clare's attack on the British saved French.

1746.—Raucoux - Charges of Scots Greys, Inniskilling Dragoons and 7th Hussars, under Sir J. Ligonier.

1747.—Lauffeld—Saxe defeats Allies in spite of the valour of the British Infantry and Ligonier's Cavalry.

1793-95.—Duke of York and Walmoden on the northern frontier of France and in Belgium and Holland. The general strategy of the Allies was contemptible as compared with the desperate energy of the agents of the "Committee of Public Safety," but throughout our soldiers did well, for example at Valenciennes, Mairechin (great charge by 15th Light Dragoons), Villers-en-Cauchie, Pont-a Chin—Boxtel, where Col. Wellesley made good use of the 33rd—Rhenan, &c. Remnants of this force ultimately, after a desperate retreat reached Bremen and embarked for home. Coote and Popham with 1,200 men destroyed the sluice of Slykens near Ostend, but could not re-embark.

1799.—Helder expedition—after some successes at Alkmaar and Bergen by Abercrombie and Dundas, the British withdrew.

1809.—Walcheren expedition—Flushing taken, great loss by sickness. Lord Chatham failed to attack Antwerp.

1813-14.—Expedition to Holland. After various operations in the direction of Antwerp, an assault on Bergen op Zoom failed.

1815.—Campaign of Waterloo; Quatre-Bras and Waterloo, June 16th and 18th.

GERMANY.

1610.—4,000 English served in Germany under Rudolph II:

1618-1648.—In the savage and ruinous Thirty Years' War, which devastated the richest parts of Germany, and in which Danes, Swedes and French as well as Germans were active, Britons played a prominent part often as soldiers of fortune of the most desperate valour.

1619.—A small British force was sent to Bohemia to assist the Elector Palatine, son-in-law of James I. against Austria.

1620.—Heidelberg and Mannheim held by British against Spinold.

1620.—De Vere's brave defence of Magdeburg against Tilley.

1624.—12,000 Britons enlisted by Count Mansfeld.

1626.—1,000 Scots on the Oder.

1628.—Leslie, Earl of Leven and the Scots defended Traisund against Wallenstein.

1630.—Thousands of British joined Gustavus Adolphus.

1632.—Heroic action of Scotch on the Leck. Tilly killed.

1633.—Reserve at Lutzen commanded by Henderson, a Scotsman. In the Swedish army were 6 British generals, 30 British colonels and 51 British lieut-colonels.

1634.—Wallenstein murdered by Irish and Scotch soldiers of fortune—Butler, Devereux, Fitzgerald, Gordon and Leslie who were splendidly rewarded by the Emperor.

1703.—Marlborough took Bonn.

1704.—Splendid strategic march by Marlborough from the Rhine to the Danube and the Iser—the Schellenberg, Blenheim; march back to the Moselle.

1704.—Capture of Treves and Trarbach.

1743.—Campaign of Dettingen; George II. and Stair against De Noailles and Grammont. British Infantry very good—valour of Oxford Blues, Black Horse and 22nd foot.

1757.—The Duke of Cumberland's capitulation at Closter-Seven did not refer to the British.

1759.—Very brilliant action of British at Minden. 12th, 20th, 23rd, 25th, 37th and 51st regiments against de Contades; but Sackville in command of the Cavalry would not charge.

1761.—Excellent conduct of British under Granby and Conway at Kirchdenkern.

1793-1805-1813.—British money maintained a considerable part of the allied forces,

Copenhagen,	1807.	Ionian Isles,	1809.
Helgoland,	1807.	Gallipoli,	1854.
Gotheberg,	1808.	Varna,	1854.
Genoa,	1800 & 1814.	Silistria,	1854.
Maida,	1806.		

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ORDNANCE

BAGGAGE

OFFICERS

60'

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NTRY

INFANTRY TENTS

GUNS

INFANTRY TENTS

INFANTRY TENTS

INFANTRY TENTS

CAMPING GROUND

BAGGAGE MULES

ORDNANCE

BAGGAGE

MULES

CROSS ROAD

BATTERY OFFICE & HOSPITAL

BATTERY MESS & STAFF

CAMPING GROUND

STORES FOR DAYS ISSUE

COMMISSARIAT STORES IN GREAT HEAPS READY FOR NEXT MARCH

CAMPING GROUND

INFANTRY TENTS

Scale 30' = 1 inch.

60' STAFF & MESS OF "A" INFANTRY BT.N

80'

60' STAFF & MESS OF "C" INFANTRY BAT.N

70'

35'

CENTRE LINE ON WHICH CAMP IS ALIGNED

MEDICAL OFFICERS & MESS

POST OFFICE

GENERAL & STAFF

CAVALRY MESS & STAFF

STAFF & MESS OF "E"

60'

20'

60'

60'

INFANTRY BT.N 45'

HOSPITAL NATIVE

HOSPITAL NATIVE

GENERAL SERVANTS & HORSES

"A" BATTALION

BAGGAGE MULES

CROSS ROAD

90'

FIELD HOSPITAL MULES

CROSS ROAD

TELEGRAPH PLANT

"C" BATTALION

BAGGAGE MULES

CROSS ROAD

SOWARS (TROOPERS) HORSES

GRASSCUTTERS

PONIES

CAVALRY SQUADRON CAMPING GROUND

SOWARS HORSES

GRASSCUTTERS

PONIES

BAGGAGE MULES

"E" BATTALION

INFANTRY TENTS

INFANTRY TENTS

INFANTRY TENTS

CAVALRY TENTS

INFANTRY TENTS

(3.) From front peg to hind peg, 4 yards. This gives enough slope to the heel rope to prevent the hind peg coming out on ordinary occasions and as there is nothing short of a tree stump that will hold a mule if she really means going the 4 yards is I think enough.

In the "commissariat transport mule gear," with which the main portion of the Indian pack transport is fitted, there are no heel ropes but a slightly longer chain and the hind pegs closer in.

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V. P. L.

THE TOTAL SOLAR ECLIPSE OF JANUARY, 1898,

AS VISIBLE IN INDIA.

BY

CAPTAIN E. H. HILLS, R.E.

A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 11th March, 1897)

COLONEL H. S. S. WATKIN, C.B., IN THE CHAIR.

THIS lecture naturally divides itself into three portions. In the first part I shall speak, as briefly as possible, of what is known of the physical constitution of the sun. The second portion will be devoted to a description of the observations that we endeavour to make during a total eclipse, with particular reference to those observations which are made by astronomers equipped with the best modern instruments, and in the third part I shall speak of the work that can be done by amateur observers, or those not provided with expensive instruments, with special reference to the eclipse of 1898, January 22, as visible in India.

In order to examine with any success into the physical condition of the sun we must make use of that invaluable instrument the spectroscope, which, as you doubtless know, is an instrument for dissecting and analysing a ray of light, by which means we are enabled to determine the character of the source from which it emanates. If we do this with the sun and pass a narrow beam of its light into the spectroscope, we shall find that the beam, after passing through the prism or other dispersing arrangement, is spread out into a spectrum or band of prismatic colours. The groundwork of this spectrum, or the bright band of colour, arises from the decomposition by the spectroscope of the white light which emanates from that portion of the sun which has been called the photosphere. Superimposed upon this band we see a number of fine dark lines, called the Fraunhofer lines from the name of their discoverer.

The origin of these lines is as follows:—Above the photosphere of the sun is a region where there are a large number of metallic and other vapours, volatilized by the intense heat of the solar surface. If such a mass of vapour were examined by the spectroscope we should get, not

a continuous band of colour, but a spectrum consisting of a number of bright lines, varying in position and intensity according to the different elements present in the vapour. On the other hand, if behind such a mass of vapour we place a body emitting a strong white light, we shall find that these vapours now absorb just those rays that they formerly emitted, and we shall get a spectrum of a bright background crossed by dark lines, these dark lines being in exactly the same position as the bright lines were, and therefore giving us information as to the particular vapours through which the white light has passed.

This is exactly the case with the sun. We have the bright photosphere, emitting white light, above that we have a region of vapours which absorb certain rays and cause the dark lines in the spectrum. This has been called the "reversing layer." Merging into this layer is a region where we get the lighter vapours, such as hydrogen and the metals magnesium and calcium, which, on account of its colour when seen during a total eclipse, has been called the chromosphere.

It is here that the well-known prominences or red flames have their origin, which we now know are composed principally of hydrogen and light metals and also the gas helium. These sometimes rise to an immense height above the solar surface.

Formerly these prominences could only be seen during a total eclipse —the light of the sun quite overpowering them at other times—but we are now enabled by means of the spectroscope to see and photograph them at any time the sun is visible. This is done by making use of the fact that their spectrum is one of bright lines, and if therefore we use a spectroscope of great dispersion we are able, so to speak, to throw away the light we do not want and select only that ray in which the prominence is visible. By an ingenious application of this principle, due to M. Deslandres, of Paris, and Professor Hale, of Chicago, it is possible to photograph the prominences, not only where they appear on the edge or limb of the sun, but actually also on the bright disc.

Outside the prominence region is the corona, which can only be seen during a total eclipse, when it forms an aureole of silver white light extending often a distance of more than the sun's diameter from the limb.

In former times a total eclipse was important because it enabled us to see the prominences. Now this particular usefulness has disappeared, though it is still undoubtedly true that we can study this region better during an eclipse than at any other time. The corona, however, we can never see at ordinary times, and it is to this most remarkable and fascinating phenomenon that the attentions of eclipse observers are particularly directed.

At the present time the observations made during eclipses are almost entirely photographic. The time available is so short and the conditions such that even the best observers seem to lose their heads. This is particularly the case with regard to drawings of the corona, and we may fairly say that these are of practically no value. The corona is not an easy object to photograph. The difference in intensity

between the outer streamers and the bright part near the limb is very great, while the outer region is that most difficult of photographic subjects, a faint object on an illuminated ground. As we require a large image it is necessary to use either a lens of long focal length or a secondary lens to magnify the image.

The British observers have adopted a standard form of instrument, it being of advantage for purposes of comparison that the same instrument should be used at different eclipses. This instrument is a double one, two cameras being mounted side by side in the same tube. One camera is provided with a lens of four inches aperture and about four feet focal length, thus giving an image of the sun about half an inch diameter. The other has a lens of nearly the same size, but a negative enlarging lens is added which magnifies the image so that the sun is 1½ inches diameter on the plate. The plates are carried in the same holder, so that the exposure, which is made by a shutter, is simultaneous on both plates. Experience has proved that the larger image gives decidedly better results. Attempts have been made to obtain photographs on a much larger scale than this. In 1893 Professor Schaeberle, from the Lick Observatory, who stationed himself in Chili, where the atmosphere was particularly clear, got some very fine photographs with a lens of 40 feet focus, thus giving an image of the sun about 4 inches diameter. The aperture of his lens was small, and he consequently only got the brighter or inner corona on the plate. Last year other observers had arranged to try to get large scale photographs, but the unfortunate weather conditions frustrated their efforts. In future eclipses this will be an important feature.

Direct photographs of the corona are valuable, not only as a record of the form of the corona at the time, but also in determining whether the corona shows any change during the actual duration of an eclipse. To this end we endeavour to place observers as widely separated as possible on the eclipse track with similar instruments, thus in the most favourable circumstances getting an interval of three or four hours between the times of observation at the two stations.

In 1893 photographs of this sort were taken in Brazil and Africa at an interval of about 1½ hours and showed no perceptible change in form of the corona, but it does not, of course, follow that at another eclipse time the corona might not be in a less stable condition and might not show a marked change of form as photographed at two stations far apart. In the cases of the prominences we know that they often remain unchanged for many hours, while at other times a large prominence may form or disappear in the course of half an hour.

For investigating the spectrum of the corona and thus determining its composition we make use of a spectroscope of the ordinary form, using a lens to throw an image of the eclipsed sun on the slit. The results obtained hitherto are far from complete. We know that the corona is partially composed of glowing gas and partially—though only to a small extent—of fine dust, reflecting the light of the sun, but what the gases are that compose it we do not know, save that they do not appear to be gases known on the earth. It is obvious, therefore, that there still remains here a large field for investigation.

Another instrument that has been successfully employed is a particular form of spectroscope known as the slitless spectroscope or prismatic camera. This instrument depends on the principle that, instead of using a slit to get a narrow beam of light, we can make use directly of the fine sickle of light surrounding the eclipsed sun, and thus get a spectrum composed, not of lines, but of rings, each ring corresponding to a bright line in the spectrum of the chromosphere. The great advantage of this form of instrument lies in the fact that we can utilise the whole amount of light falling on the lens, and we are thus enabled to reduce the exposure and take a correspondingly greater number of photographs during a given time.

With an instrument of this class Mr. Shackleton succeeded last year in photographing the spectrum of the "reversing layer," and thus proving that it really existed, which was contrary to the opinion of some astronomers.

Several other instruments are also used, but time does not allow us to describe them. We must, however, say a few words with regard to the mounting of eclipse instruments, obviously a very important point.

In all cases where the exposure is to be something more than an instantaneous one some means must be adopted to keep the image in a fixed position on the plate. This can be done either by mounting the camera equatorially and driving it by a clock to follow the sun's motion, or we may place the telescope in a fixed position and reflect the light of the sun into it by a plane mirror. In the latter case the mirror only is moved, which, inasmuch as it is much lighter than the telescope, is the preferable method. We must, however, have a truly plane mirror, which up till lately was not an easy thing to procure. Now, however, thanks to the great skill of Dr. Common, late President of the Royal Astronomical Society, we are in possession of a number of plane mirrors, whose perfection leaves nothing to be desired. Having thus briefly passed in review the various observations of eclipses that are made by the use of good instruments, and whose object is to elucidate the physical constitution of the solar surroundings, particularly the corona, we may now say a few words on the secondary phenomena. By the term secondary we understand a phenomenon, the observation of which has no direct bearing upon solar physics, but which may be interesting from other points of view.

Among these we may mention that appearance known as "Baily's beads." These are seen just at the moment when totality is all but complete. The rapidly narrowing ring of light is seen to run into a number of luminous points or drops. The explanation of this lies in the fact that the limb of moon is not quite smooth, but presents a slightly serrated appearance, which serrations cut into the narrow crescent of light. The phenomenon is of no importance, but, as it will be found alluded to in many accounts of eclipses, it is as well to mention it.

A more interesting phenomenon, and one of which it would be very desirable to secure a permanent record, is that of the so-called shadow

bands. These are seen just at the moment of totality and are something like the reflection of a ray of light from a water surface disturbed by ripples. They appear to move over the ground, but are better seen on a white background such as a wall or side of a house. Attempts have been made to photograph them, but hitherto without success, and I would suggest them as a good subject for the amateur photographer. The lens must be one of large aperture, since the amount of light available is small and the exposure, owing to the rapid movement, must be almost instantaneous. A whitewashed wall, if in proper position opposite to the sun, would do well as a background, or if this be not available, a tightly stretched sheet would do as well or better.

In hill stations, where a large extent of country can be seen, the amateur observer would do well to watch the most impressive phenomenon connected with an eclipse, the approach of the moon's shadow. To do this to advantage he should watch the sun till the eclipse is nearly total, and then, turning his *back* to the sun, look at the advancing shadow. If he is in a position to get a very distant view, such as no doubt could be obtained at stations at the north end of the line, from which the slopes of the Himalayas can be seen, it would be quite worth while to try to get a photograph of the landscape showing the moon's shadow on the earth. This presents no difficulties, and any amateur photographer who is lucky enough to find himself at a suitable place could undertake it. Such a photograph would have no great scientific value, but would form an interesting record of the eclipse.

Attempts to draw the corona are not of much value; anyhow, in the case of inexperienced observers. The same is true of observations made with an ordinary telescope which will not show much more than can be seen with the naked eye. Those who possess telescopes will, no doubt, set them up for use, and if the air be particularly clear it is possible that some fine coronal details may be seen.

The observer may, of course, try to draw these, but such drawings, even if made by a skilful draughtsman, will have but little value as compared with photographs.

We now come to the question of the amateur astronomer who wishes to photograph the eclipse. Let us consider what chance he has of success. The ordinary photographic camera and lens, on account of the short focal length and consequently small image of the sun, is not of much value. An approximate rule for calculating the size of the sun's image on the plate is that it is $\frac{1}{10}$inch diameter for 1 foot focal length of lens. A whole plate lens will therefore only give a sun about $\frac{1}{12}$ inch diameter on the plate, which is obviously too small to show much detail. We must therefore enlarge the image, which can be done either by increasing the focal length or by placing a negative lens behind the principal as is done in the case of the so-called telephoto combination.

As a means of increasing the focal length we may remember that with the ordinary rectilinear doublet the focal length of each of the lenses in the combination used singly is twice that of the whole combination. The optical distortion introduced by using only a single lens would be of no im-

portance for this purpose. If a properly mounted telephoto lens be not available an excellent one could be improvised by placing a negative or concave spectacle lens behind an ordinary photographic lens. Such a spectacle lens can be obtained from any optician for about a shilling, or the eye-glass of a *short*-sighted friend might be borrowed. The ingenious amateur would find no difficulty in constructing a simple camera in box form, and by varying the distance between the two lenses it is possible to get different degrees of magnification. It will, of course, not be possible to make an exposure longer than about 1 second unless the camera be mounted so as to follow the sun's motion, a condition somewhat difficult of fulfilment with a roughly constructed instrument. It would, however, be not at all impossible to improvise some arrangement by which the sun's motion might be followed for a short time, say 5 seconds. If this could be accomplished good photographs might undoubtedly be obtained.

There are various ways in which this might be done. I shall here content myself with one or two suggestions, leaving the observer to develop the ideas in the direction his inventiveness leads him.

The first requisite is that the camera should be mounted on an axis parallel to the axis of the earth. This presents no difficulties. To get the motion perhaps the simplest way would be to have a screw pressing up against an arm attached to the camera. A small telescope with a cross-wire in the eye-piece must be fixed to the camera, and should be so adjusted that when the image of the sun is in the requisite position on the plate the cross-wire is tangential to the limb. The observer will then look through the telescope and move the instrument steadily by means of the screw, keeping the cross-wire always touching the limb during the time of exposure. This appears a laborious and difficult process, but is perfectly feasible. One enthusiastic astronomer has proved that it is possible to take star photographs with an exposure of *1 hour*, driving the camera by hand, so that an exposure of 5 or 10 seconds cannot be considered to present any insuperable difficulties.

If an automatic movement be desired it might not be impracticable to design some form of water clock which would give a smooth and sufficiently regular motion.

In conclusion, it may be pointed out that a total eclipse is one of the most impressive and fascinating of natural phenomena, and no one—whether he be astronomer, photographer, or mere spectator—should fail to take any chance of seeing one that comes in his way. The opportunities of seeing one are not many, owing to the very narrow band which constitutes an eclipse path on the earth. In India, in January next, a number of good stations are available and easily reached by railway. A map is here annexed, showing the path of the shadow, which has been reduced from the excellent map issued by the Indian Survey. The weather chances through Central India appear to be as good as possible, and we may therefore confidently look forward to successful observation and to a solid advance of knowledge.

DISCUSSION.

THE CHAIRMAN—I do not know whether there is any gentleman who would like to ask Captain Hills any question on the subject of his lecture. I feel sure that this number of the "Proceedings" will be read with the greatest interest by officers quartered in India, where, doubtless, there are many who will be able both to observe and photograph the eclipse. On the only occasion on which I was fortunate enough to see a total eclipse I was only able to get hold of an ordinary 3-inch telescope belonging to the Library at Gibraltar, which, though mounted on a stand, had no mechanical means of moving it to follow the sun. But even with this imperfect instrument the view when totality commenced was most impressive and never to be forgotten. Captain Hills has so fully described what one ought to see, and how best to see it, that I feel sure it will stir up officers in India to get hold of the best optical means in their power to view the eclipse of 1898. With regard to photographing the eclipse, I am afraid amateurs will find themselves at a disadvantage, for I fear it requires rather more delicate apparatus than they will have means to manufacture to enable them to follow the movement of the earth with sufficient exactitude. I hope, however, some will have a try. I should like to ask Captain Hills if the common spectacle lens would not alter the focus of the different coloured rays and thus spoil the photographs?

CAPTAIN HILLS—No, not materially.

THE CHAIRMAN—You think it would not make any practical difference?

CAPTAIN HILLS—No, it would give a fair definition.

MAJOR P. A. MACMAHON, F.R.S., R.A.—We shall all be very grateful to Captain Hills for the very lucid manner in which he has put everything before us; in fact, he has given us an excellent *resumè* of the present state of knowledge of solar physics. It is a large subject, and he seems to me to have selected well from an enormous mass of material, and to have presented it to us in a very concise form. We have the satisfaction, too, of knowing that we have got the information absolutely from the fountain head, because Captain Hills is at present the Secretary of the Permanent Eclipse Committee, and he has himself taken a very prominent part in recent eclipses and has produced most valuable work (applause). The other Secretary of the Permanent Eclipse Committee is Dr. Common, whom we have seen before in this room, and who, I am very sorry, is not here this evening. There is one thing which I think we must have all remarked in regard to the subject of the corona—the great difference between the photographs and the extremely fantastic drawings that were apparently made by certain selected observers in Washington. There did not seem to be any similarity. There appears to be a sort of optical illusion connected with the corona, for those who observe the phenomenon seem to see much which the photographic camera shows to have no existence. I have seen one total eclipse in India in the year 1874, but I was not at that time taking very much interest in the matter and I did not know what there was to be seen. It is a great satisfaction to know that a large number of our brother officers who will be quartered either on the shadow or within easy reach of it will have, many months beforehand, ample information on the subject, and will be able to take an interest in it and to make preparations for any observations they may think of making. With regard to the sweep of the shadow over the landscape, I saw that phenomenon very well in Norway this summer. I went up with Dr. Commons's expedition to see the total eclipse, but, as is well known, we did not see it, because ten minutes before the time of totality clouds came and obscured the sun and the moon, which was

darkening it. Therefore, we took advantage of the fact that we could not see the corona or the prominences in order to observe the sweep of the shadow. The plan described by Captain Hills is the one we adopted. At the moment when the totality was commencing we faced round, turned our backs to the sun, and then we saw the distant horizon suddenly become perfectly black, and this blackness appeared to be advancing towards us. There was one very remarkable thing which we noticed. The ship in which we had come to the fjord, the Norse King, was lying on the path of the shadow. As it was night time the ship was lighted up, but, it being broad daylight, you could not see the lights on the ship. But, as the shadow swept over the ship, suddenly it sprang into brilliancy. All the lights stood out and it presented a magnificent spectacle.

A. B. Kempe, Esq., F.R.S.—I must apologise, as a civilian stranger here, for making just one or two observations in reference to Captain Hills' most interesting lecture. I have heard a good many scientific lectures, but I have rarely, if ever, heard one in which so much information was given in a short space of time. There is one special point to which I wish to refer; it is one which Major MacMahon has already mentioned, and that is the extraordinary inability of the human observer to see what really happens. With regard to the corona it is perfectly obvious, of course, that the photographs that we have seen differ most materially from what previous observers thought they saw. But now that observers have these photographs before them, and know exactly what it is that the corona looks like, it would be interesting that they should observe the phenomenon again and let us know whether these extraordinary appearances which they have recorded as having been seen by them in the past would be seen by them now. I dare say a great many of you have seen those very interesting photographs of horses in motion, and know how different they are from the representations of horses made in the olden days. Now that we have these instantaneous photographs taken which enable us to see distinctly what the nature of the movement is, for my own part I must say that in observing horses since I have always most distinctly seen the phenomenon as presented by the photographs, and not in accordance with my previous idea of the way horses moved. The interesting point would be to see whether an observer in looking at the corona would now see those extraordinary wings extending so far from the image of the sun which appear so totally different from anything that the photographs show. The difficulty is to understand how any human being should have supposed there were these curious excrescences in a particular direction. I believe the photographic camera does not, as a matter of fact, take exactly the same picture as is seen by the human eye. There are some slight variations owing to the chemical effect of the rays upon the photographic plate. But still such differences as appear between the photographs and the drawings of the observers seem to me to be very surprising, and one would really like that an observer, having seen these photographs, should, forewarned, tell us what he sees.

Captain C. Orde Browne—I do not think there is any occasion for me to say what I believe Major Abdy expected me to say, because my observations were connected with the transit of Venus. I may say however that we drilled in a most thorough manner with a model that was of the same apparent size. We had a hole cut in a plate and a reflection of the sun from a looking-glass through it, and a metal disc to represent Venus which passed across it at the proper rate, and we drilled with that. When the critical phenomenon occurred nervousness was greatly prevented, because we could hardly persuade ourselves we were not looking at the model. One thing however we were not up to, a bright white line which ought not to have thrown us out if we had been properly instructed. There is a peculiar effect when you get the black body of Venus

crossing the edge of the sun and meeting what appears to be a perfectly black sky. If you hold your finger or thumb up against any white or bright object you will see a sort of shadow—a black drop, as it is so called. That had to be watched till it deepened in a peculiar way and the moment recorded. I remember directly after this I noticed, to my horror, a white line coming along on the edge of Venus as she had suddenly gone back, and it puzzled me sorely for a minute or two. Happily, I had recorded the critical moment first, so that it did not affect my observation. Now we might have been warned, because Captain Cook had noticed it, but no one took the trouble to see what he had recorded. With regard to observation by eye, I believe one should go exactly by one's own perception and never mind what one is expected to see. You are a very good instrument if you only give yourself a fair chance. I may say that I strongly believe in availing ourselves of ladies' eyes as well as men's (laughter). I believe they are better on the whole than men's. There was a young lady, when I was in Egypt, in regard to whom I particularly noticed this. She had the advantage of irresponsibility and she was guided solely by her perceptions and, when I found that what I had noted agreed with her observations, it added much to my confidence; in fact, I believed more in her observation than in my own. I think that there are reasons for concluding that women see, generally, rather better than men. One is that I have never heard of a woman who is colour blind. I read that this was so many years ago, and have watched since but have heard of none; but the most remarkable thing I ever heard was what was mentioned to me by Döllen, who is the brother-in-law of Struve, Astronomer Royal in St. Petersburg, and an experienced astronomer. He told me he was taking some ladies to observe Venus in his observatory, and he remarked to them before they put their eye to the telescope: "Now, you will not see Venus as you think, a complete circle, but you will see her a very thin crescent like a new moon." One young lady said: "I see her now as a crescent." He said: "You see her as a crescent; which way are the horns turned?" She said: "Oh, the horns are turned to my left." He said: "Put your eye to the telescope." She did so and then she said: "I was wrong; I see it plainer in the telescope; they are on the right. But," she said, "it is very odd, when I take my eye away I see the horns on the left." She did not know that it was a reversing telescope and that he was putting a very severe test upon what she saw, but she was right all the time. Now, I tried all sorts of ways to see Venus as a crescent when my eyes were at their best. I have tried pricking holes in cards, but I never could see Venus as a crescent. I think then if people were first fairly instructed what to watch and then made observations, with a perfect absence of prejudice and determined to put down simply what they saw, their observations would be more valuable than some of those shown us in the very interesting slides to-night.

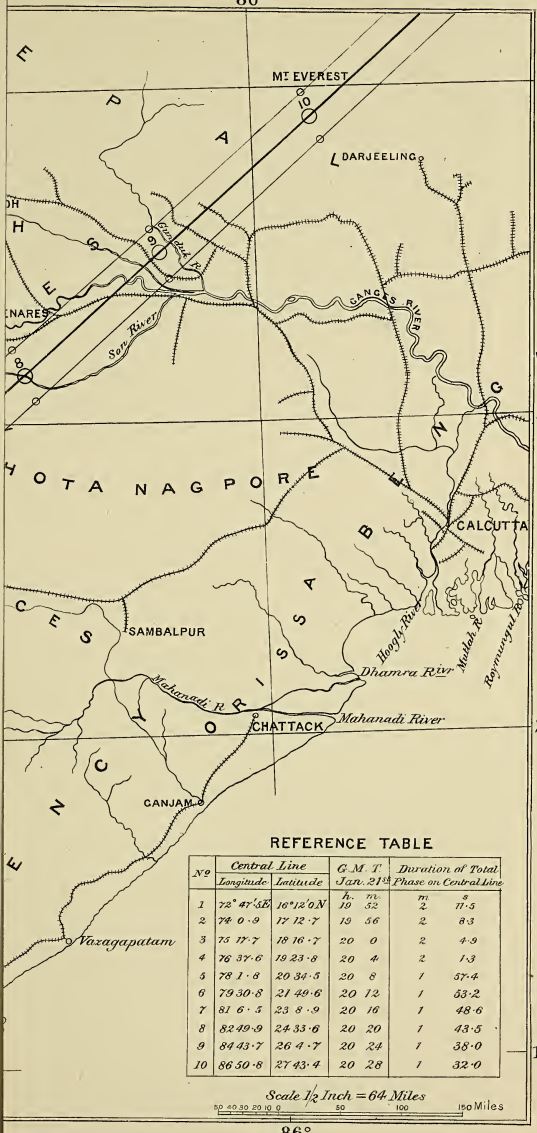
REPLY.

Captain Hills—In reply to one or two points which have been raised. The difference between the photographs and drawings of observers is a very interesting point. There is no doubt that these long extensions of the corona which have been drawn are often real ones. Extensions have been photographed to quite a diameter and a half of the sun away from it. We must remember that the photographic plate takes little account of differences of colour which may be quite apparent to the eye, and if therefore we take photographs and drawings of a white object on a blue ground the drawings will tend to show greater contrasts

than the photographs, and thus these long, but faint, extensions may be drawn quite sharply while the photograph shows no trace of them. The only corona I have seen—that of 1893—appeared to me exactly like the photographs. If I had been able to draw I should have drawn it exactly like a photograph, with no long rays; I had, of course, seen a good many photographs before. In eclipse work drill is a very important point. We used to rehearse the thing for several days beforehand. On the last day before the eclipse we went through the whole programme with plates in the cameras at the exact time that the eclipse would occur, so that all the instruments were in exactly the same position that they would be on the day. I do not think there are any other points, and I will only thank you for your very kind attention.

THE CHAIRMAN—I can only express my own and your feelings by thanking Captain Hills very cordially for the most interesting lecture he has given us and wish him all luck in the observations next year when he goes out to India (applause).

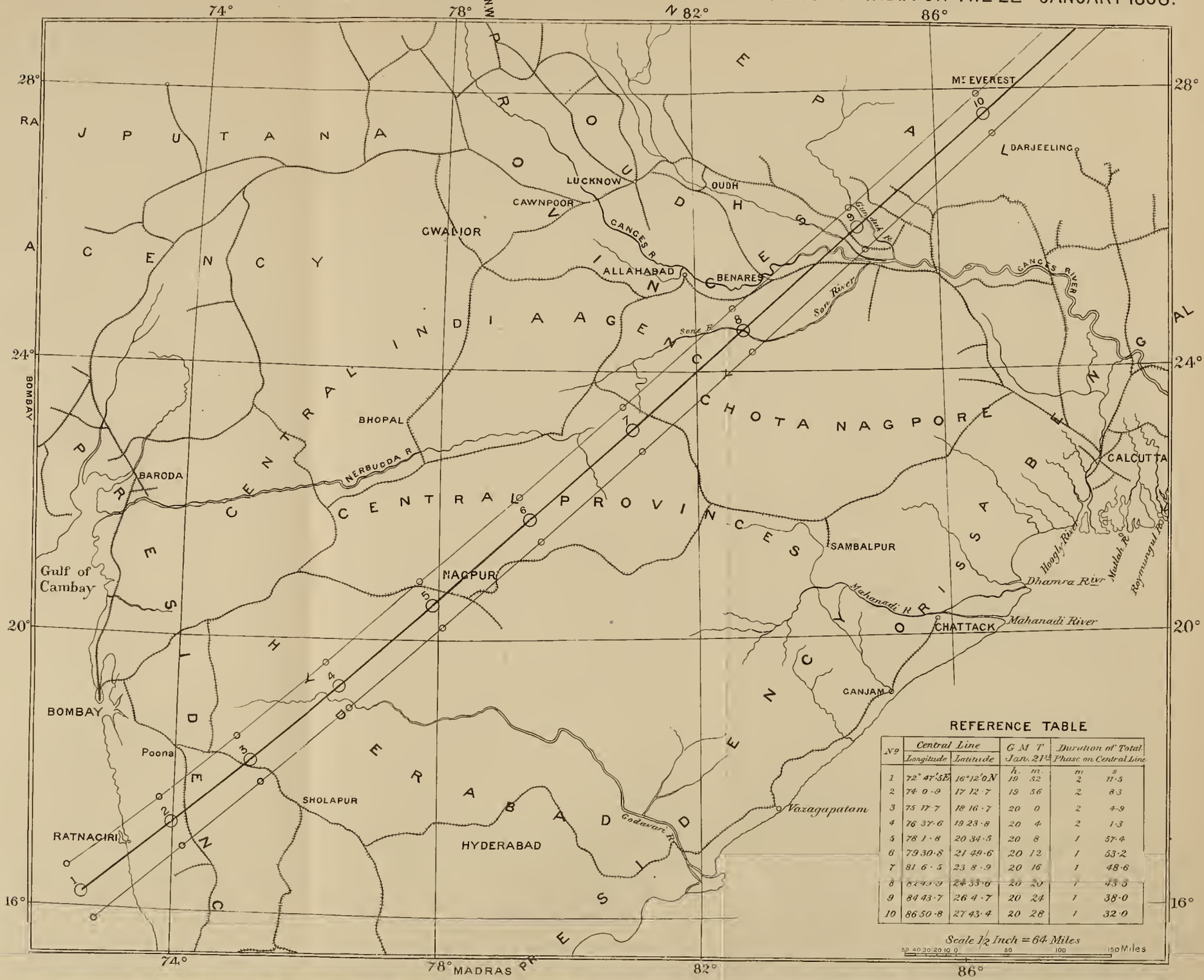
OF THE SUN IN INDIA ON THE 22ND JANUARY 1898.



REFERENCE TABLE

No	Central Line		G.M.T.	Duration of Total Phase on Central Line
	Longitude	Latitude	Jan. 21st	
			h. m.	m. s
1	72° 47'·5E.	16°12'·0N	19 52	2 11·5
2	74 0·9	17 12·7	19 56	2 8·3
3	75 17·7	18 16·7	20 0	2 4·9
4	76 37·6	19 23·8	20 4	2 1·3
5	78 1·8	20 34·5	20 8	1 57·4
6	79 30·8	21 49·6	20 12	1 53·2
7	81 6·5	23 8·9	20 16	1 48·6
8	82 49·9	24 33·6	20 20	1 43·5
9	84 43·7	26 4·7	20 24	1 38·0
10	86 50·8	27 43·4	20 28	1 32·0

MAP SHOWING THE PATH AND LIMITS OF TOTALITY OF THE TOTAL ECLIPSE OF THE SUN IN INDIA ON THE 22ND JANUARY 1898.



REFERENCE TABLE

No	Central Line		G M T	Duration of Total Phase on Central Line
	Longitude	Latitude	Jan. 21½	
			h. m.	m s
1	72° 47·5E	16°12·0N	19 52	2 11·5
2	74 0·9	17 12·7	19 56	2 8·3
3	75 17·7	18 16·7	20 0	2 4·9
4	76 37·6	19 23·8	20 4	2 1·3
5	78 1·8	20 34·5	20 8	1 57·4
6	79 30·8	21 49·6	20 12	1 53·2
7	81 6·5	23 8·9	20 16	1 48·6
8	82 49·9	24 33·6	20 20	1 43·5
9	84 43·7	26 4·7	20 24	1 38·0
10	86 50·8	27 43·4	20 28	1 32·0

J. 2

SHORT NOTES ON THE MONTENEGRIN ARMY.

BY

LIEUT.-COLONEL De C. DANIELL, R.A.

During a short stay in Montenegro last summer I was able to collect the following information regarding its military organisation from an officer whose acquaintance I made and from notes kindly given me by Mr. R. Kennedy, H.B.M. *Charge d'Affairs*..

Every man who is sound has to serve from 18 years of age till 40 in the 1st class and from 40 to 60 in the 2nd. The nominal strength of the army is 50,000. The infantry is divided into eight brigades, the number of battalions in each varying according to the population of the district from which they are drawn.

I.	Brigade	52	companies.
II.	,,	51	,,
III.	,,	38	,,
IV.	,,	54	,,
V.	,,	46	,,
VI.	,,	31	,,
VII.	,,	29	,,
VIII.	,,	25	,,

A total strength of about 40,000.

The number of companies in a battalion varies from 6 to 10. The company is divided into four zugs under a sergeant, there being also a corporal to every 10 men, the whole commanded by an "officer" without further distinctive rank. To a battalion there is a commander (colonel) and a second in command (major), both mounted officers.

Drill is carried out on Sundays and holidays from 7 a.m. till 11 a.m. by companies and battalions alternately. Brigade drill is carried out under orders from its general and lasts from 10 to 15 days. Occasionally three or four brigades are massed by orders of the Prince for grand manœuvres, lasting four or five days.

A company is usually recruited from one village forming its headquarters, and having its own rifle range. Good shooting is the main point, drill as such being of secondary importance.

Every horse in the country fit for military service is registered and numbered and when required the owner is paid according to the time for which it is used. Pack horses are used in the ammunition columns, of which there are two to each brigade ; every soldier carries in addition 120 rounds.

During the last few months an important change has been introduced.

A battalion 700 strong is mobilised for four months at Cettinge. It is composed of men drawn by lot from the whole army, equally from the several battalions. These are quartered in excellent barracks recently built, with all the necessary buildings and a large parade grouud. During this period they are thoroughly trained and return to their battalions when it is completed and fresh batches come up in turn, so that before long there will be a very good proportion of well trained men in every battalion; 30,000 are armed with Berdan rifles, a gift of the Czar and the remainder with Werndl rifles given by the Austrians.

The bayonet is not used, but every man carries a handzar or long knife in his girdle and 20,000 are also armed with revolvers; the officers carry a sabre and revolver.

The artillery consists of—

(1.) Eight mountain batteries, one being attached to each Infantry Brigade. Six guns (7½ centimetres) to a battery and six horses to each gun, two of which carry the ammunition.

The *personnel* consists of three officers and 150 men, the commandant being the only mounted officer —

16 rounds per gun are carried with the battery.
48 „ „ „ „ „ 1st ammunition column.
96 „ „ „ „ „ 2nd „ „
all on pack horses.

Every year these batteries drill and practice for at least 15 days at the head-quarters of their brigade.

(2.) Field Artillery consists of—

Two batteries of six guns each (7½ centimetres), Krupp, at Cettinge, with which drill and practice are carried out. 40 rounds are carried per gun; no wagons.

The *personnel* consists of a commandant and three officers (all mounted) and 180 men.

In addition there are in store one battery presented by the Russians and one by the Turks—these are of an older pattern—also a siege battery of six guns (12 c.m.) kept at Cettinge and Autivari.

There is no cavalry force, beyond the Prince's mounted body-guard.

The Prince is head of the army and the Crown Prince commands the standing force at Cettinge. For war the infantry is formed into divisions under a Vojvoda (duke).

The dress consists of a :—

"Jelek," or red waistcoat, with sleeves for winter use.

"Jamedon," or short red zouave jacket, with floating sleeves.

Baggy red knickerbockers, drawn together at the waist by a woollen cord.

"Kushak," or leather girdle in which the revolver and morocco leather cartridge pouch are carried. Over this is a woollen kamarband—for officers it is of silk of mixed colours.

"Opanquerz," or leather sandals, cut from one piece of leather, the same as worn by all peasants, and most serviceable.

Over the stockings is worn a white woollen legging fastened by hook and eye up the back.

The officers' dress is very effective, the waistcoat and jacket being richly laced with gold. In place of the latter a "dolman" or full skirt tunic, also richly embroidered, is sometimes worn; this is nearly always white, sometimes dark green. The pantaloons are embroidered at the pockets in gold, also the gaiters up the back seam. The staff officers wear patent leather jack boots.

A red pork-pie cap, embroidered in black, is worn by all—a small badge in front indicating the rank.

Nearly all peasants, as well as soldiers, carry a revolver in their belt and by special order of the Prince it is to be at all times loaded. This is rigidly enforced.

I was present at the funeral ceremonies of the late Princess Olga, at Cettinge, and was much struck with the soldier-like bearing of the men. They were of fine physique, well drilled and marched splendidly. Most of the officers had seen service in the many wars with the Turks, judging from the show of medals and decorations; one, in particular, told me he had fought in four pitched battles and fourteen engagements and had won the Montenegrin and also the Russian gold order, both for distinguished bravery.

Up to a few years ago no roads existed for wheeled traffic, but now an excellent one has been made from Cattaro to Nicsic, crossing the many mountain ranges intervening—the ascent being made by almost innumerable zig-zags. The Montenegrins as a rule travel on foot, as they are splendid walkers but poor horsemen. They are a hardy and frugal race, and one can see at a glance that they have been for generations, as they are at present, a nation of soldiers.

J. C.
J. J. B.

REPORT

ON

MILITIA ARTILLERY COMPETITIVE PRACTICE, CORK DISTRICT, 1896.

BY

COLONEL H. TORKINGTON, R.A.

"Some said 'John print it,' others said 'not so,'
Some said 'it might do good,' others said 'no.'"—*John Bunyan.*

THE OBJECT OF COMPETITION.

The study of gun drill and practice requires much steady, solid plodding; it is tiresome, undoubtedly tedious, and from the great variety of detail even difficult to properly acquire. At annual inspections it has not been the custom to see a regiment of artillery working as a whole at fortress drill so the main work of artillery militia has always suffered in comparison with the more easily acquired but more showy infantry battalion movement of marching past and the numerous minor drills of a company's parade. The adjutants have reported the difficulty they all experienced in getting the officers to acquire a knowledge of gun practice (the horses though regularly brought to the water would not drink !).

There was not sufficient interest: it did not appear to them to be much good when they had learnt it, etc. Why ? because practice was conducted in such a desultory manner, that little knowledge on the part of the officers was necessary and, as they took any amount of time over it, perfection of drill on the part of the men was not necessary either. No body of men can shoot accurately and quickly unless thoroughly taught and drilled. Moreover, there must be a tangible result and something to compare it with.

Modern fortress drill is like all our games, inasmuch as the individuals are posted at different points, but all are relying each on the other to

do his part: failure on the part of one is loss to all. The officers play the most important parts, as is right; they should therefore be the best taught. The system of officers and men all clustering round the one group of guns firing, as has hitherto been done, has prevented the requirements under service conditions being realised.

It was evident competition alone could generate the necessary excitement to induce all hands to really give their minds to the work. The conditions of the competition should be so framed as to bring into prominent notice the vital points bearing on success.

The marks for accessories should be in each case few, but sufficient to call attention to the points where improvement was desired; in no case should marks for detail be allotted in sufficiently large numbers to counter-balance the actual shooting.

Most of the practice of Militia Artillery has hitherto been at standing targets, a waste of ammunition from heavy traversing guns and no more use on the day of action than practising potting rabbits is to a man at a battue. The enemies' ships will be veritable rocketers and 15 minutes will be the utmost time they will be in the arcs of fire of any gun, generally less. Smart, quick drill and rapid firing will be alone useful; therefore, moving targets should be always employed for practice.

In May, 1896, the permission of the General Officer Commanding was obtained to issue the following order:—

MILITIA ARTILLERY PRACTICE, 1896.—CORK DISTRICT.

ORDERS BY THE LIEUT.-COLONEL COMMANDING THE DISTRICT.

29.5.96. Cork.

Competitive practice will take place this year amongst all the regiments of Militia Artillery, Cork District, training in the harbour.

Colonel H. Torkington, R.A., Commanding Militia Artillery, Cork District, will present a cup to the winner under the following conditions.

Note.—It has been authorised that a grant of money may also be made from the canteen to the *men* of the best company in each regiment taking part in the competition.

CONDITIONS FOR COMPETITIVE PRACTICE.

MILITIA ARTILLERY, CORK DISTRICT, 1896.

1.—Only those regiments practising in Cork Harbour will be eligible to compete.

2.—The competition will take place under instructions for "Practice over sea ranges, 1896," except in cases provided for below.

3.—Target to be of "*b*" pattern, which may be decorated by the regiment to make it more visible.

4.—Six rounds to be fired per company from two guns and at least two rounds to be by ordinary fire. The remainder *may* be salvoes.

5.—Credit will be given for the discipline. In case of a tie, reference will be made to the score when the prize will be awarded to the regiment excelling in points in the following order :—1st, hits ; 2nd, time; 3rd, discipline.

6.—Competition to be carried out from R.M.L. guns, 7-inch and 10-inch.

7.—The Ammunition to be that issued for annual practice.

8.—Regiments using their own specialists will receive special marks.

9.—The major will fill one vacancy amongst captains, should such exist, in the capacity of B.C., otherwise the senior company officer will command his own company as B.C.

10.—It is optional to employ two G.O.'s or one, but they must both belong to the company. The P.S. N.C.O.'s are available for this duty after the company officers are exhausted.

11.—Each B.C. to have a D.R.F. and the C.O. acting as F.C. and in charge of practice to have another instrument, P.F. or D.R.F. (umpire's rule 2, p. 38, cancelled).

12.—*Time* allowed 15 minutes per company, to be reckoned from "commence fire" (guns run back and unloaded), all rounds to complete practice will be fired, but any not judged by the umpires to be within the 15 minutes, will not count, except in the case of a tie—both ties being overtime (para. 11, p. 34, A.P.S.R., 1896, is cancelled).

13.—The practice to be carried out half an hour after tide has turned and the mean range will be as near as possible 2000 yards.

14.—On "cease fire" being sounded by the C.O. the time will be noted by the umpires, and if the cause is that the range is blocked, allowance will be made by deducting the minutes till "commence" again sounds, during "cease fire" no work must go on at the guns or the regiment will be disqualified.

15.—Gun-layers to be selected by O.C. companies from amongst their own men.

16.—Credits will be awarded as follows :—

Company Credits.		Total of Points.	
Six hits, each 36	216		
Drill series	50		
B.C., G.G.C. and adjuncts	20	336	
Time allowance 10 per every minute, under 15 minutes—possible	50		
Regimental Credits			
Communications, etc.	10		
C.O. command (power of)	10		
Arrangements for control	10	64	
Regimental specialists	14		
Practice reports and criticisms thereon	20		
Grand total		400	

17.—The practice reports must be in the district colonel's office by mid-day on the day but one following the practice or no marks will be

given for it, unless the cause of delay is allowable in the estimation of the umpires.

18.—No allowance of time can be made for buoys being in the line of fire; this will be a matter of luck, but the regulations on the subject must be observed.

19.—*Drill series* will be carried out as laid down in para. 10, p. 34, "Practice over sea ranges."

Service practice series as in paras. 11, 12 (omit 13 to 16), 17, 18 and 19. C.O. company to state if he is going to use case I. or II.

Rule 35, p. 16, "*re*" red flag on tug, to be carried out.

Page 32, in line 5; marks for hits, *for* 200, *read* 216.

20.—The target will be loosed on the tide so as to have an average range of about 2000 yards.

R.A. officers have kindly volunteered to assist in umpiring and Colonel Walker, R.A., Commanding Cork Harbour, has kindly consented to give every assistance, decide result and make the award, which will be final.

H. Torkington, Lieut.-Colonel, R.A., and Colonel
29.5.95. Commanding Militia Artillery District, Cork.

UMPIRE RULES.

On May 31st at Fort Westmoreland the umpires met and, on the basis of the foregoing conditions, made the following rules and division of marks, which seemed best suited to the local conditions:—

1.—C.O. to receive set of foregoing conditions, by which he must be guided.

2.—Each B.C. to have at his disposal a D.R.F. and each C.O. a D.R.F. or P.F.

3.—"Cease fire" must be sounded by C.O. whenever range is blocked or guns out of action for any cause and the time will be noted by the umpires till "commence" is again sounded.

4.—CREDITS WILL BE AWARDED thus:—

Hits, 216 (36 per round), half marks added to full score when using 7" R.M.L. guns.

Time, 10 points allowed for every minute under 15 in which practice is completed, part of minute not counted.

The maximum credit for discipline = 100, to be divided into 50 for drill series and 50 for practice.

The former 50 to be sub-divided into:—

10 for time,
20 ,, laying,
20 ,, drill

(full marks for four minutes. One mark deducted for every 30 seconds or part of 30 seconds).

The latter 50 to be sub-divided into :—

20 for discipline at practice,
10 ,, ease and accuracy of communications,
10 ,, arrangements for control,
10 ,, power of control,
7 to D.R.F. men ... } regimental specialists,
7 to flag signallers ... }
20 for practice reports and criticisms.

The principle adopted was that vital mistakes should be marked high ... ... maximum 10,
ordinary errors in drill low... ... maximum 4.

5.—In case of a tie the result will be decided by :—

1st, The company that made most hits.
2nd, The company that made best time.

6.—The target to be placed by the umpire-in-chief, who will then give the word to the C.O. to "go on." The C.O. then takes complete command and responsibility.

Umpire-in-chief ... ... Colonel H. Torkington, R.A.
Assistant umpires ... ... Captain W. Griffin, R.A., I.R.F.
Lieut. L. L. Harper, R.A., I.G.
,, Hon. M. R. Ward, R.A.
,, A. H. Ollivant, R.A.

REPORT.

From the commencement of the trainings the work was entered into with zeal; drill became smart and quick and the officers began to grasp the fact that the accuracy of the shooting really depended in a great measure on their power of observation; their skill and quickness in correction; their perfect knowledge of all the small details connected with the use and abuse of the guns and their appliances and when the days of practice came each officer voluntarily watched every shot, studying and discussing cause and effect and picking up all the hints he could to profit by in his turn.

It was a grand point this year to secure the services on range of an experienced officer of the R.A., a well-known good sailor (a great point for marking on range), who kindly volunteered to report for the whole of the practice of the several regiments; and I would take this opportunity of bringing to notice the great benefit derived from the assistance, in the capacity of umpires, of the R.A. officers, Lieutenant L. L. Harper, R.A., Instructor of Gunnery, and Lieutenant Hon. M. R. Ward, R.A., Inspector of Warlike Stores, and Lieutenant A. H. Ollivant, R.A. They voluntarily gave their time and, by their evident knowledge of the subject and their careful attention to details, created a feeling of complete confidence in the awards.

On the completion of each day's practice the umpires met in committee and from notes they had severally taken during drill and practice, they awarded the points according to the prearranged scale; the regimental marks were similarly awarded at termination of the entire practice.

I am glad to be able to report the competition has brought about a great improvement in the drill and markedly better results in the skill and accuracy of the practice. All the tedium and consequent perfunctory manner of carrying out the drill and practice died away and an earnestness and eagerness pervaded all ranks in their search for knowledge and desire to excel.

A fresh interest was found in acquiring experience of the details of ammunition and fittings, in the adjustment of accessories, in the drill of the adjuncts, etc. The officers became critical on the value and age of ammunition, on the shortcomings in the guns and fittings, and even in the method of working the forts themselves, realising the influence for good in the care of details and necessity for great attention in observation and quickness of decision on their part. They, in their turn, took care that the men were well drilled.

To insure a practice going straight through at a useful rate of fire requires much knowledge, experience and drill. This, I hope, is now being understood, though much remains yet to be done to bring the practice up to the mark of what is possible.

This competition is merely a trial, a start, but I hope a real start, which will not be lost. Yearly improvements on fresh lines under ever shortening conditions for competition will cause the militiamen to be treading on the heels of the regulars in their endeavour to take their place in the front line on the day of action.

The remarks of the several colonels and adjutants all combine to acknowledge the benefit of the competition which excites the officers and men to learn more thoroughly the practical details of their arm of the service and I can strongly recommend that the competition be continued annually and the kind offer of the honorary colonels commanding the regiments to present a challenge cup be accepted.

The Clare and Waterford Artilleries trained at Fort Carlisle for 27 days only.

The Cork and Limerick Artilleries at Fort Camden for 41 days. The last named regiment, however, encamped in Fort Westmoreland, Spike Island, for the first fortnight, which meant they had very little gun drill during that period, but the longer training certainly told on the results.

POSTSCRIPTUM.

Since the above report was compiled, the honorary colonels of these Regiments—

Lord Bandon,
„ Gort,
„ Inchiquin,
„ Roberts,

have presented a handsome challenge cup for annual competition.

The continuity of the effort in this district is thus assured and, I hope, may be initiated in others.

It is therefore worth while mentioning where I should propose, from the experience of last year, to alter and amend the regulations for competition.

1.—The manning of forts for coast defence is the most important duty of the Garrison Artillery and should constitute their main parade. The command of this parade should be always exercised by the senior officers present with the regiment; and should include responsibility for the safe conduct of the practice and the management of everything, such as tugs, targets, range party, firing batteries, etc., employed at drill or practice. This requires much watchfulness, general alertness, and care in arrangement, such as would be necessary in action; it should be the colonel's parade and might be officially recognised as such.

2.—All the regiments of the district might be allowed to compete, wherever trained, provided they use traversing guns and moving targets.

3.—In order to ensure a maximum of men being trained, a larger number of squads per company should be formed, from which selection would be made, as in the regulars; but this is possible only if sufficient guns are provided to drill with.

4.—Gun-layers should be similarly trained in greater numbers and selected according to rule.

5.—The number of rounds of ammunition is sufficient at present, but some shell might be fired—this being the kind of projectile which would be most used in action and is the most difficult to use accurately.

6.—The nature of the guns used in practice should be more varied; all men cannot be trained at one nature—there are not enough guns—and the gun, men are trained at should be the one they fire from. During a training, 12 days is the average number that each man undergoes gun drill; no squad can therefore be taught more than the drill of one gun; this is sometimes a 12·5″ and may in the near future be a B.L. gun; the ammunition, if slightly more expensive, should not be grudged.

It is not the case that men having been taught the drill of one of the 9″, 10″, 11″, 12·5″, R.M.L. guns, can drill equally well at either of the others. The difference in the fittings, the mountings and the idiosyncrasy of the gun itself would hamper the men in competition.

7.—The limits of the rectangle counting as a hit should be reduced; the present rule which enlarges the area in proportion to the range seems fair in practice, although diametrically opposed to what would happen in reality. The longer the range the greater the angle of descent and the less the limit of error which admits of a hit; as a side issue, the reduction of the vulnerable area, makes the task of the range officer to estimate accurately easier.

8.—In the construction of the target, this officer could be further aided by small flags being boomed out from the main flag-post of the target, 10 to 20 feet. This would, moreover, increase its visibility from the battery and in no way decrease the speed of a target floating in a tidal race. An addition of tin pieces to the top of the flag-pole and from the top to the floating cross-beams are preferable to flags, which twine round the pole, reducing the objective to the width of a few inches and rendering it most difficult to see; the tin also glitters in the light.

9.—The limit of time should be reduced, as soon as the efficiency of the gun squads warrants such reduction.

10.—It might be taken into consideration whether the allowance for time for smoke in the casemates could be abolished. It is distinctly a service condition and some means might possibly be found to counteract this cause of delay, when using the D.R.F.'s.

11.—The employment of P.S. sergeants and sergeant-majors as *G.O.* is not advantageous or desirable. They are certainly available, but are not as quick as the young officers; they could be best employed in general duty on the gun floors to prevent accidents, etc. Being absent for months together from regimental duty, they are out of practice and much behind the times.

12.—The forts henceforth will be properly equipped and organised; the regimental efforts to make communications and obtain control will now be superfluous and marks for the same can be abolished.

13.—I recommend that each company during training should have three extra instructors drawn from other militia regiments and the regulars—this would be an economy, as the maximum of instruction should be taught the militiamen during the period of payment; time is lost at present for want of instructors.

That this competition does good also indirectly, must be inferred by the attention it claims from the public in the counties. Thus on arrival of the winning regiment at Limerick, all the townspeople and neighbourhood met it with their bands and escorted it amidst cheers to the barracks. The cup was exhibited for some time in shop windows. This public recognition must give help to recruiting of men. Officers will also join where really defined work is to be done, and honour obtained in the doing it.

RESULTS

OF THE

Competitive and Comparative Statement of Marks Gained.

	Drill series				Practice series			Allowance for 7th R.M.L.	Total	Grand Totals		
	Company	Time	Laying	Drill	Discipline	Hits	Time					
1st Limerick City Artillery	1	10	20	18	18	216	20	...	322	Average company figure of merit... ...		248·16
	2	9	20	18	...	180	20	...	267	Regimental points: Communications...		10
	3	6	20	16	10	180	10	...	252	Arrangements for control		10
	4	9	20	14	20	108	0	...	71	Power of control...		10
	5	7	19	16	20	216	20	...	298	Regimental specialists		0
	6	10	15	16	20	108	30	...	199	Practice reports and criticism ...		20
										Grand total		298·16

COMPETITIVE STATEMENT OF MARKS GAINED.—*Continued.*

		Drill series			Practice series					Grand Totals			
		Company	Time	Laying	Drill	Discipline	Hits	Time	Allowance for 7" R.M.L.	Total			
2nd Cork Artillery	1	10	0	8	15	103	30	...	171	Average company figure of merit			175·2
	2	5	0	10	0	72	0	...	87	Regimental points: Communications	8		
	3	7	15	15	12	180	0	...	229	Regimental points: Arrangements for control	0		
	4	8	10	6	10	144	30	...	208	Regimental points: Power of control	0	42	
	5	8	13	12	12	144	0	...	189	Regimental points: Regimental specialists	14		
	6	5	18	5	10	36	50	...	124	Regimental points: Practice reports and criticism	20		
	7	6	8	10	15	180	0	...	219	Grand total...			217·2
3rd Waterford Artillery	1	9	8	5	0	0	0	...	22	Average company figure of merit			133·4
	2	6	15	15	15	72	0	...	117	Regimental points: Communications	8		
	3	6	20	15	12	108	0	...	161	Regimental points: Arrangements for control	5		
	4	8	10	19	17	108	30	54	246	Regimental points: Power of control	8	39	
	5	7	10	8	12	36	30	18	121	Regimental points: Regimental specialists	8		
										Regimental points: Practice reports and criticism	10		
										Grand total...			172·4
4th Clare Artillery	1	2	15	10	5	0	0	...	32	Average company figure of merit			80·16
	2	6	5	5	0	72	0	...	83	Regimental points: Communications	8		
	3	8	20	15	10	36	0	18	117	Regimental points: Arrangements for control	5		
	4	0	20	0	15	72	0	...	167	Regimental points: Power of control	0	18	
	5	6	0	8	5	72	0	...	91	Regimental points: Regimental specialists	0		
	6	0	5	2	5	36	0	18	66	Regimental points: Practice reports and criticism	5		
										Grand total...			98·16

REMARKS.

The old complaints of ships blocking the range all days were not made this year.

Shipping was equally numerous, but the drill being quick and reliable and the fire control vested in the hands of one man, the C.O. being more perfect, advantage could be taken of a brief clearing of the range to get off a series where formerly the opportunity was lost.

Thus the length of duration of each practice was:—

1st day,	Clare Artillery,	4	hrs.,	6	coys.,	36 rounds.
2nd „	Waterford „	1½	„	2	„	12 „
3rd „	„ „	1½	„	3	„	18 „
4th „	Cork „	1½	„	4	„	24 „
5th „	„ „	1¾	„	3	„	18 „
6th „	Limerick „	2½	„	6	„	36 „

The average period of time selected as a limit was a good one, as out of the 24 companies competing, 13 fired their number of rounds within the time (15 minutes) and of these, nine companies fired sufficiently under time to secure extra points at the rate of 10 points per minute under.

Thus two companies Waterford Artillery scored 60 extra marks between them; one was the winning company and shot well; and the other shot badly from hurry.

„ two companies Cork Artillery scored 80; one shot well and was placed 3rd in the competition; one shot badly from hurry.

„ five companies Limerick Artillery scored 100; each company being about two minutes under time, shewing good, steady drill.

The details of hits and time were as follows :—

Regiment	No. of coys. who fired within time (15 minutes)	No. of rounds fired	No. of hits		
			In time	Out of time	Totals
Waterford 5 coys.	3	30	9	2	11
Cork 7 „	4	42	24	5	29
Limerick 6 „	5	36	28	1	29
Clare 6 „	1	36	8	5	12

In the Drill Series, time of two rounds carried out as per practice over sea ranges in each company was :—

Company	Clare	Limerick	Waterford	Cork
No. 1	9·12	4·6	4·50	4·15
„ 2	6·34	4·31	6·25	6·56
„ 3	5·20	6·24	6·5	5·45
„ 4	9·15	4·56	5·20	5·19
„ 5	6·15	5·49	6	5·1
„ 6	10·20	4·24	...	6·58
„ 7	...	...	...	6·3
Average time per coy.	7·49	5·10	5·44	5·45

The cease fire sounded for one cause or another in the middle of a series—

With 12 companies once,
„ 2 „ twice,
„ 2 „ three times.

ARRANGEMENTS FOR FIRE CONTROL.

Each of the regiments carried out its own idea of communications and control and provided its own material.

The Clare Artillery had a single wire with weighted carrier clips from the C.O. to foot of the slope of the fort, thence by orderlies

to B.C.'s and verbal orders down the skylights to group floors. Return messages and replies, if necessary, by orderly. Trumpeters were allotted one to the C.O. and one to each B.C., the former also had coloured flags to indicate which B.C. he was addressing.

The Waterford Artillery had two single wires from the C.O. to the B.C.'s one of which required an orderly between its upper terminal and the C.O., a distance of 80 yards. From B.C.'s to groups by verbal orders down skylights.

Trumpeters were allotted one to C.O., one to each B.C. The former also had coloured flags to indicate which B.C. he was addressing.

The Cork Artillery had double endless strings on pulleys to give and receive messages; an orderly to top terminus, 15 yards and orderlies for bottom terminus to B.C., 10 yards. B.C. to group by orderlies, 10 and 60 yards.

One trumpeter with C.O., no trumpeters at B.C.'s to acknowledge or pass on orders. C.O. had no means of distinguishing groups he was addressing.

Limerick City Artillery.—Communications double endless strings to one B.C. direct; speaking tube to the other B.C. to groups by orderlies and 10 to 60 yards.

One trumpeter for C.O. to B.C.'s with distinguishing "G.'s."

Two trumpeters with B.C.'s to acknowledge and pass on to groups.

This regiment's arrangements gave a complete control!

Every allowance must be made to the regiments for the novelty to them of the scheme; but now that they have grasped the idea I expect greater perfection will be annually attained and they will profit by the practical form the interest of their Honorary Colonels in the work has taken.

A VISIT TO SOUTH AFRICA.*

BY

LIEUTENANT C. B. LEVITA, R.H.A.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 4th March*, 1897.)

COLONEL E. BLAKSLEY, R.H.A., IN THE CHAIR.

THE CHAIRMAN : The Lecturer, Mr. Levita, has recently been in South Africa on leave, and he met many people of note, so that we hope he will be able to give us a good deal of interesting information with regard to the country.

I may tell you, as one of the Committee of this Institution, that he is lecturing by the request of the Committee, and the Committee consider that it is most gratifying to find young officers like Captain Shortt, who lectured here a few weeks ago, and Lieutenant Levita, coming forward to lecture in this manner. (Applause.)

LIEUTENANT LEVITA : Colonel Blaksley, Ladies and Gentlemen,—It is with the greatest diffidence and humility that I comply with the request made that I should address such a critical and well-informed audience as I see before me, especially in connection with such a gigantic subject as South Africa.

The enormous mass of literature that has been within the reach of all for the past year or so has possibly told you everything that I have to say on the subject ; but I shall try to give you some of the impressions formed during a hurried visit to that interesting country and after meeting many people whose opinions, from their thorough knowledge of the country, are worthy of note.

If I only can interest you about one tenth part as much as I interested myself in travelling there, I shall be satisfied.

Besides, the exchange of an English winter for an African summer is one which others on leave may contemplate, and in that case my journey may be of service.

* This lecture was extempore.

I am painfully conscious of the criticisms that I lay myself open to in attempting to lecture after such a flying visit, but I do not claim to have done or seen anything extraordinary, but merely to have spent a few pleasant months perhaps a little out of the beaten track, and certainly in a country where, as the Christy Minstrels would say, "there are razors flying in de air."

If I begin by telling you the route I traversed, you will be able to follow me on the maps you are each provided with.

I landed at Cape Town and stayed there for a week, and then went up country by the railway you will see marked, past De Aar to Kimberley. I meant to have stayed at Kimberley and to have gone over the mines, but when I found that I should not be able to get out of Rhodesia because of the Matabele rising, except by the way I was going in, by Mafeking, I decided to leave Kimberley till my return journey. I therefore went straight on to Mafeking, which was the end of the railway.

Thence I went by coach to Buluwayo, and from Buluwayo I made one or two trips into the country, once out to the scene of Mr. Rhodes' grand Indaba on the Matoppos, and further south down towards the Gwanda District. I meant to have gone down the Tuli Road, and so into the North Transvaal, but communication was not yet properly established.

Back from Mafeking to Kimberley, I then visited the diamond mines there. I do not mean to say anything about these mines, although a good deal might be said about them, because I shall not have time.

From Kimberley I went to De Aar, which is the junction for Port Elizabeth, and north again for the Transvaal, to Johannesburg.

From Johannesburg I went into "the garden of Africa," Natal, taking en route the Boer battlefields. I rode and drove over the battlefields, climbing Majuba Hill, and rejoined the railway at Ingogo. Thence to Maritzburg, where I found hospitable gunners and lancers, and on to Durban. From Durban I went back to Glencoe Junction and off into Zululand, visiting the battlefields of Isandlwhana and Rorke's Drift.

I then returned to the Transvaal for the Christmas races, after which capital meeting I started for the Cape Colony.

When we got to De Aar Mr. Rhodes joined the train from Kimberley, and I travelled with Mr. Rhodes, General Sir Frederick Carrington and their party, all the way to England.

That is the general outline of my trip.

I should recommend anybody who thought of taking such a trip to go from Johannesburg down to Delagoa Bay, a most beautiful bit of railway, to go out by sea and come into the country again at Durban; and then go up the line, taking the battlefields on the way. I think that would be more satisfactory, but the fever was then too bad in Delagoa Bay to allow me to do as I had intended.

The mere voyage out does not call for any particular comment; ship life, as you all know, is much of a muchness everywhere, but as compared with the voyage to India the trip to the Cape is one of the most enjoyable sea-faring things — generally not a ripple after leaving Madeira, and only a sixteen days' journey from England.

The mention of Madeira reminds me of an incident that rather exposed the nautical knowledge of one of my fellow passengers.

Many went ashore at Madeira and this gentleman, whose acquaintance

with the sea and its ways was not to be gauged from his faultless yachting suits and caps, went in a boat with me.

As we passed under the bow of the ship he remarked that the ship was drawing twenty-one feet of water. That seemed to interest him.

As we were coming back again (the ship in the meantime having taken in 200 or 300 tons of coal) he noticed that the ship was drawing nearly twenty-three feet of water.

He stared for a moment, gave a whistle, and said "By Jove! how the tide *has* come in!" (Laughter and applause.)

After Madeira there should be no stoppage till the Cape. We however stopped when one of the stokers, who was known on the ship by the name of Nansen, threw himself overboard. There were many sharks, but with good luck and management he was picked up in fourteen minutes. He had been on an arctic journey recently and it was evidently not a very wise thing for him to have gone straight away to the tropics afterwards. When recovered he was off his head.

If there is wind Cape Town has a very difficult harbour to enter, and having landed when a south-easter is blowing it will be found that Cape Town is about the most objectionable place on the face of the earth.

I think perhaps that, before saying anything about Cape Town, a glance at the history of the Cape, as showing how the Dutch have made the Cape for us, may be of interest.

It was Drake who first sighted the Cape as early as 1580, and in writing about it described it as "the most stately thing and fairest cape we saw in the whole circumference of the world."

About forty years after that the English flag was hoisted there, but no settlement was made.

You will remember that the Dutch in those days had a considerable Indian trade. A Dutch ship, on its way to India, was wrecked at the Cape. The people who were wrecked eventually returned home and reported so favourably on the Cape that a few years afterwards, in 1651, Van Riebeek, who may be called the father of the colony, took about 100 souls out there and formed a colony.

I might point out that the rather abused Dutchman has done a great deal for England. Not only has he made the Cape what it is, but his agricultural tastes are of the greatest value throughout South Africa; and even in England all must admit that William of Orange did a great deal for the British constitution.

After the Dutch settled at the Cape there were wars between Holland and England, and eventually in 1806 England took over the colony, paying the Dutch £6,000,000 indemnity.

That is how it came into the possession of the English.

In 1834 the English government insisted upon the emancipation of slaves. That was a matter which caused great dissatisfaction to the Dutchmen, and they decided to trek north. About 10,000 Boers therefore crossing the Orange River, which you will see on the map, formed the Orange Free State; some going still further north, crossed the Vaal River to make the Transvaal.

Arriving from Europe one is not struck with Cape Town as a town; nor with the hotel accommodation, the food, nor any of the points which make it the most desirable place for a holiday in South Africa, from the colonial point of view.

I know it is rather dangerous to say that the food in South Africa is

bad, for I remember the remarks made upon the late Lord Randolph Churchill's criticisms on food there. After having been feasted at Johannesburg he wrote, in one of his letters to the *Daily Graphic*, that "having 'dined,'(?)he long'd for a quarter of an hour at the Amphitryon." That has never been forgiven. I may say that the best food I had in South Africa was at the mess of that smart mountain battery at Maritzburg where I had the pleasure of dining.

Cooks in Natal are mostly Indians, for some reason termed coolies, which strikes one as quaint from an Indian point of view ; all natives of India, and Natal swarms with them, are known as coolies.

The question of the hour in Natal is the endeavour to stop the influx from India.

The scenery of Cape Town is certainly striking, for the magnificent rugged Table Mountain rises sheer for about 4,000 feet behind the town. The road around the Table Mountain compares, to my mind, very favourably with the Cornichy Road. I went round it on a bicycle, literally "dragged at beauty's car," for a tow-line from a Cape cart containing 'woman ! lovely woman ! ' levelled the steep gradients.

The forts at Cape Town are remarkably well placed and very strong. The armament consists of 9·2 inch guns on H.P. mountings, and I believe that a considerable number of additional guns, forming a medium armament, will shortly be in position.

The garrison is considered by Africans generally to be very insufficient for the wants of the country. It consists of three companies of garrison artillery and about two and a half battalions of infantry.

Apparently reliance is a great deal placed on the volunteers instead of on regulars. Any native risings which may occur, unless they happen to be in certain parts which are directly under the Imperial control, are tackled by volunteers, and if they fail then and then only will Imperial troops be called in. No troops have been employed for quelling the recent native risings in the colony.

The volunteer question is one that is attracting considerable interest at the Cape at the present time ; a commission has been travelling about the colony, and I trust that they have come to the conclusion that the volunteers are insufficient in numbers and wanting in equipment.

For instance, consider the artillery. It would take about 800 volunteers to man the forts at Cape Town, and as at the present moment the authorities can only lay their hands on 300 this reveals a deficiency of 500.

With reference to the commission mentioned it is of interest to consider that, when the question of issuing arms to Dutch farmers was looked into, the Cape Dutchmen expressed willingness to fight against *alien* races and foreign interference *only*.

The Houses of Assembly at Cape Town are worth noticing, because they are modelled on the Westminster Houses. Note that at the Cape the Dutch party rule the country. They have a considerably stronger position than had the Irish party in the last Government. That is due to the fact that small numbers of farmers scattered about the country have as much representation in Parliament as the dwellers in towns which are considerably populated.

Having been present at the meetings for Mr. Rhodes, I am aware that the people in the towns can make a good deal of noise even if they cannot make laws.

With a rapidly-increasing urban population, this Dutch strength will become weaker.

Time will not permit of reference to the lovely suburbs of Cape Town, the vineyards, notably Constantia ; nor of description of the unique Groot Schur, Mr. Rhodes' place, which I visited before and after the disastrous fire.

If you will look at the map you will find that when you come to travel the railway system of the Cape is very awkward. There is still a want of railway development throughout the colony. If one wants to go by train into the Transvaal from Kimberley, or further north from Mafeking, one has to come all the way south to De Aar. If one wishes to go from Cape Town to Port Elizabeth, or from Cape Town in the direction of Graaff-Reinet, one has to make tremendous rounds which take days.

In fact the Cape government railways look for their seven per cent., and the policy of making railway follow trade is adopted in opposition to the Rhodesian and American plan of making trade follow the railway.

Soon after leaving Cape Town one begins to pass through what is called the Karoo ; desolate flat-topped hills rising out of plains of stunted burnt-up bush. Here are herds of goats, sheep and ostrich, and a number of springbok may be seen ; but not a blade of grass nor a drop of water.

This particular bush on the Karoo I believe has a considerable amount of moisture in it, and the flocks manage not only to live but to thrive with little or no water.

The dry climate of the Karoo is wonderful for cases of lung disease, and many people with consumptive tendencies go there to the benefit of their health. Possibly a more suitable climate is found further north, near Kimberley.

Kimberley is thirty-five hours from Cape Town. At the last meeting of the De Beer's Company at Kimberley it was agreed to erect a home for consumptive people. That is a little plan of Mr. Rhodes', and there was discussion amongst his friends as to what name should be given to this home. Now Mr. Rhodes particularly dislikes two things in this world, of course the one being "unctuous rectitude," and the other a pun.

It was suggested to him that a native word, meaning 'our home,' should be used ; which appeared satisfactory. The word however is pronounced like 'Lungeeley,' which approaches 'Lung-healey' ; needless to add the place will not be called "our home" in native language.

It is a great cruelty to send advanced cases of consumption to these parts. The comforts and requisites for a sick person are not easily obtained.

There is a tremendous want of water all the way up country, from Cape Town right up to Buluwayo, and it is extraordinary that the country should not have had any big schemes for water conservation, or canals, developed, such as India and Egypt have.

Consider the Orange River, one of the few rivers that is not a dry sandy track at any time of the year ; now that river is allowed to run to waste into the Atlantic Ocean, no real attempt being made to turn its splendid volume of water into the north of the Karoo, and through many parts of the country where it would make the land of enormous value.

While I mention the Orange River I might point out the bridge where the railway crosses the Vaal River.

Supposing we were at war with the Transvaal this would be a magnificent place, and a very easy place, for a cavalry foray to destroy the railway communication ; there is no loop line nor defence of any sort ; if the bridge were destroyed the whole of the country north of the Orange River would be, to say the least of it, seriously inconvenienced.

I believe the question of irrigation will meet with more attention in the future. The want of action has been put down to the fact that the Dutch, who rule the Cape, are constitutionally lethargic and unenterprising. When their power is a little bit weakened, water supply and railways will possibly receive more attention than at present.

I mentioned distribution, let me say a word about franchise.

Take the case of any born or naturalised British subject—naturalised after he has been resident for twelve months—if he owns property to the value of £75, or is in receipt of £50 a year salary, if he can write his name and address he gets a vote. As against that I would compare the state of matters in the Transvaal.

There it is rather difficult to get any definite knowledge as to what the franchise is, there are so many rules ; but the most accurate information I could get was that a foreigner can be naturalised after two years' residence, but he must renounce all other political rights and pay the sum of £5. Then he must be resident fourteen years before he can have a vote.

The number of voters in the Transvaal is about 17,000. The population of Johannesburg itself is about 50,000, and in the neighbourhood of Johannesburg there would be about 150,000.

To return to Kimberley, I may mention that the leading paper of that mining camp showed enterprise. Upon arrival at the station I purchased a copy and was surprised that the first item of news was that "Major" Levita, R.H.A., was about to arrive in Kimberley. They must have been short of news.

The country north of Kimberley is veldt ; uninteresting plains with the inevitable kopjes or flat-topped stony hills. The veldt is remarkable to my mind, after travelling in India and Mexico, for the apparent absence of animal and bird life.

There is nothing of interest to mention until one gets up to Mafeking, which is fifty-four hours, or about 223 miles, from the Cape.

Mafeking is interesting because that is the place where the Jamieson raid started from, or from Pitsani Pitlogo, about seventeen miles away. When one gets to Mafeking one is under the impression that one has arrived not only at the end of the railway, but at the end of everywhere ; it is a dismal place.

From Mafeking the new line starts for Buluwayo. It was being laid at the rate of about a mile and a half a day. I travelled on the contractors' train up as far as Mochudi, then the end of the line.

I understand that by the end of April the railway will be as far north as Palapye, King Khama's capital, and it is hoped that by the beginning of next year it will have reached Buluwayo.

At Mafeking I took my coach ticket, and a very serious thing it was to take, £22 10s. being the price of the ticket, 2s. 6d. lb. for luggage ; find one's own food and be charged for the weight of it.

As the acme of discomfort I unhesitatingly recommend the Buluwayo coach.

Many will probably remember Buffalo Bill's coach when it was at

Earl's Court; an old American hickory-wood coach, with clumsy leather springs. Well it is in one of those things that one travels to Buluwayo; twelve seats inside and goodness knows how many on the top, the mails being also piled up on the roof. The seat one sits on is about the breadth of the small book I hold in my hand. There is no back to it but just a small leather strap; one sits with knees rammed up against the knees of the man opposite, packed like herrings on each side, unless one gets the corner seat; then one gets banged the whole time against the side of the coach and suffocated with dust, and such dust!

Gilbert must have meant South Africa when he wrote—

> The earth of a dusty to-day
> Is the dust of an earthy to-morrow.

The coach itself is dragged by relays of ten mules at a time. Poor mules! They had been tremendously hard worked owing to the Matabele war, which put everything at high pressure; they were mere bags of bones, and to get them along at all was a matter of continual flogging. A man sits on the box with a long whip in his hand, known as the driver. The man who holds the reins is termed a louper, but generally one of them runs along side distributing blows indiscriminately with a sjambok to keep the mules moving. We moved at the rate of anything, from one to three miles an hour.

I was seven days and eight nights in that coach.

One does not stop to sleep, but merely to boil the kettle and feed. Sleep is almost an impossibility, as can be imagined.

I noticed with amusement the mule which received the most flogging was christened 'Villoughby,' or 'Bobby Vite.'

There is a certain spice of excitement in the coach journey, because wheels come off, the coach upsets, and other small things happen which tend to disconcert one.

The nightly amusement was to light a match occasionally and see the most extraordinary attitudes that everybody had got to in their broken slumbers; all tumbled about like ninepins.

The road itself is a mere track winding in and out of the scrubby bush which exists the best part of the way to Buluwayo. To venture off the track is very apt to lead to one being lost. At first one hardly believes that, but one finds in taking a few paces off the road how completely every trace of the road seems to have disappeared, and the country has no landmarks generally.

There was a young fellow named Grey, a cousin of the administrator, who was on one of the last coaches before I went up. He strayed away from the coach, and to the lasting shame of the other men, they went on without him. When I was there natives had just found his body, found about 150 yards from the road, dead of course for want of water.

I met the Gunners coming down from Buluwayo, and two of their men strayed away from the road and were lost. I believe they were afterwards found, one of them in a very bad state.

One sometimes travels as much as eighty miles without reaching water, and when reached it is hardly worth having, being more liquid slime than water. The contractor of the coach had done everything he could to provide water; he had sunk wells at considerable expense along the road, but unsuccessfully, and several of the changing stations had to be abandoned.

A word of praise to the canvas water-bag of Africa, which might be copied in India.

The road is a veritable Golgotha, owing to the rinderpest carrying off the cattle engaged in transport ; and the mummified carcases and abandoned wagons point the fearful mortality that has taken place.

As everything for Buluwayo has to be brought on wagons about 600 miles it can be realised that the loss of the whole of the transport animals is a most fearful blow to the country.

A gentleman appointed to a high post was starting from Mafeking to take up his duties in Rhodesia, after certain events had happened in the Transvaal. He telegraphed to Buluwayo officials that he wanted transport. They gave him a special coach, but that apparently was not sufficient. They were anxious to provide more but they did not know how to, so they telegraphed : " What do you suggest ? " The answer sent back was : " Suggest oxen." (Laughter.)

Due to the rinderpest, the freight on goods from Mafeking to Buluwayo is very nearly £6 cash per 100 lbs. weight.

The loss of the cattle is a very serious thing ; apart from agricultural views and the fact that there are many transport riders whose whole life was devoted to this transport of baggage, for to the natives cattle mean more than money.

Cattle form the basis upon which all exchange is regulated. A native does not value land ; he scrapes the land to make a few mealies grow, but his whole property is reckoned by cattle.

Remember the description given by Veterinary-Captain Nunn, who lectured last week, that when buying ponies from the Basutos he had to turn his money first into cattle, and then with cattle purchase ponies. The native even purchases his wife with cattle.

Rinderpest then is a most fearful blow to the native population of Africa. It is calculated that Khama alone, in Bechuanaland, has lost over 800,000 head of cattle.

The natives do not so much resent the plague carrying off their cattle as they do the shooting which has been done very extensively with a view of checking the rinderpest, so far ineffectually.

They cannot understand killing to save lives.

The moment rinderpest showed itself in a herd that herd was destroyed, and any of the herds that had been brought into contact with it. The shooting has perhaps been done in rather a reckless way.

There is one man near Kimberley, a Mr. De Pass, who has lost through the shooting of cattle alone a sum of between £15,000 and £16,000.

I tell you these things because it gives you an idea what the rinderpest means.

Whilst I was there Dr. Koch arrived, and he was soon busy trying to find a cure by inoculation, and I see since that he claims to have found one. Whether he will manage to check it or not is doubtful, there are great difficulties.

The colonists generally have an idea that it will spread right through to the Cape, and that the sooner it gets there and they can begin re-stocking the country, the better. They say that notwithstanding the many regulations which exist, birds, such as tick birds, which feed on and go about with the cattle, and jackals, etc., etc., will probably take the rinderpest down south.

It is a curious thing that there should be such a wonderful absence of vultures, jackals, and various animals of prey in that country just

now. I hardly saw one in the whole 600 miles, notwithstanding the fact that there are dead animals lying in every direction.

Some people explain it as being brought about by the rinderpest poison, stating that these animals having gorged themselves at the beginning of the rinderpest, have largely died ; I just give it to you for what it is worth, but there is undoubtedly a great absence of these creatures. They would be very useful at this present time.

Remember that an African wagon has from eighteen to twenty oxen. Consider the thousands of wagons there are ; now all the oxen have died. You can then imagine the fearful state of the roads.

It was unnecessary to use the sense of vision, the sense of smell was frequently sufficient.

I believe the rinderpest has worked right down from north of the Zambesi, and has come down as I show you on the map, keeping away from the sea.

Sir Hely Hutchinson, governor of Natal, told me that a remarkable point about the rinderpest is that it has not made its appearance within 150 miles of the sea, and he was in great hopes of being able to keep it out of Natal and out of Zululand.

When I came away the rinderpest had got to the Orange River, where it had been checked.

There are wire fencings erected at the cost of thousands of pounds to the various governments, and those wire fencings are stretched the whole way along the Orange River and all round Natal and Zululand.

There are also very stringent regulations preventing natives, horses, carriages, or indeed anything, passing the line of fencing without a considerable amount of fumigating. Cattle, of course, may not pass at all.

I was fumigated three times. The fumigating is not particularly unpleasant. They put your rugs into a sulphur box, which makes them smell for a time, and they dip your boots into Jeyes' disinfecting fluid ; that is how I was disinfected, except when I was going into Natal.

There they conducted me to a lavatory with a large number of basins ranged round, and I was very gravely requested to "use a nail brush."

I was glad to use it, for I had been travelling for some time and was very pleased to have a wash ; but there was an old Boer who came in behind me, and I think one might have asked him to have swallowed a charge of dynamite and he would have been less surprised.

The Boers are apparently rough in the way they disinfect the Kaffirs, they not only put them in a sulphur box as they do in the colony, and keep them there for five minutes, but on the Mafeking side some men were soused in carbolic and dragged through the river. Two men, according to the papers, were killed, and the attention of the High Commissioner directed to the case. It seems an effectual treatment for infection.

It is a curious thing that in S. Africa they do not seem to have fairly tried the camel. I believe it has been tried in German territory.

In this country in its present state, transport having broken down, the camel would be of the greatest possible use if it is not liable to rinderpest ; and even if it is, rinderpest is only a temporary affliction. It would at any rate, if not for transport, be useful for keeping up communication with the lakes and Barotze country, where there are pioneers absolutely cut off from communication.

To get back to the road again, the next place of any interest was Palla ; your maps are not quite right here because one comes quite

close to the Crocodile River, or Limpopo. There is not much of interest about Palla, except that it is practically a collection of abandoned wagons ; there are hundreds of these wagons grouped together and then the inevitable grog shop has sprung up along side to complete civilization.

The canteens are all in the Transvaal, and it is necessary to cross the river to get a drink there.

Next comes Palapye. That is rather an interesting place because it is supposed to be the largest kraal in Africa. I dare say some of you saw King Khama when he came to England.

He is the pride of Exeter Hall, and he allows no alcoholic liquor in his country ; even travellers cannot get liquor without a doctor's certificate.

The natives there carry firearms of every description. Khama sent a column, of doubtful value, up to help in subduing the Matabele.

Palapye is built on sand ; unfortunately the rains do not beat much there. I never have seen such sand as there is in the neighbourhood of Palapye, the coach sinks in half way up the wheel.

Apropos of that sand I think it worth mentioning that the coach wheels wear grooves in the middle of the tyre. I should have thought the wheels would have worn first at the outside of the tyre, but I noticed the groove round the centre of the tyre in a good many coaches ; one could almost lie a finger in the groove in bad cases. Why that should be I cannot explain, but I trust some one present will do so.

I spoke of the armed natives. It is perhaps interesting to note the fact that of the Kaffirs, as natives are generally called in South Africa, the Cape boys form excellent fighting material. I suppose these really correspond to what in India are known as Eurasians, who are not regarded as favourable fighting material.

The Kaffir has not that apparent respect for the white man which the Asiatic possesses. Ugly, dirty, and clad in nondescript cast-off European clothing, frequently uniform, he fails to give the favourable impression which is produced by the suitably and often neatly-clad Indian.

A walk round a compound of the De Beer's Company however shows many interesting varieties of Kaffir, generally of superior physique to Asiatics.

There is a marked difference in the native policies of the various South African powers. A politician there put it like this : "It is England's policy to protect and encourage the native. He is a man and therefore a brother (!), so he is hedged in with prevention of drink and fighting regulations. In the Transvaal the native is ruled with a rod of iron. The Boer recognises no possible equality between the black and the white man and, until recently, did not prevent him drinking. The Portuguese use the black man as much as they can, sell him liquor, make money out of him, and provide him with arms to fight other natives with." I think these are three rather distinct policies. (Applause.)

To get back to the road I have again wandered off, the next place worthy of mention is Tati.

Here one arrives at the first gold mines, of which there are two ; only one however is at work, The Monarch.

Tati is a little state, mostly owned by French shareholders, governed directly by the Crown with no connection to the Chartered Company, and is the oldest European mining camp in this part of Africa.

A small collection of mud and the ubiquitous tin houses—but the scene of a tragedy whilst I was in the neighbourhood. A prospector, a man of good education, good appearance and manners (a 'varsity man, I was told), ran 'amok.' He commenced operations by throwing dynamite cartridges at the canteen, and then took to his repeater. So did the others and he got killed. Some said he shot himself.

Leaving Tati, after a sit-down meal and a bath, two solid luxuries on this journey, one begins to enter this enormous country Rhodesia, which extends for over one thousand miles, giving free access to the lakes Tanganyika and Nyassa.

I believe the area of Rhodesia is estimated at some 75,000 square miles, without considering treaties with Khama and other chiefs. The difficulties of getting into the country are rather great, but they will be greatly removed when the railway gets to Buluwayo. The three principal ways of getting in are: this way, by Mafeking; secondly, the way by which I hoped to have come out, down through Tuli; this route leads across the Crocodile River and into the north of the Transvaal by Pietersburg; thirdly, from Mashonaland, by landing at Beira and so on to Salisbury; here also a railroad is in construction.

I may here mention that there is some wonderfully good big game shooting to be got up the Pungwe River. I met men who had just returned from shooting there.

A great want to Rhodesia is a waterway, to enable one to get into the country, and the Zambesi hardly answers the purpose.

The Zambesi is navigable about 300 miles, to a place called Tete, which is marked on the plan, in Portuguese territory, and I believe there is only one transhipment of goods necessary. With the light draught boats which will eventually be imported, more use will be made of the river; but the great fault about that waterway is that it is so very unhealthy.

Rhodesia is divided into two big divisions: the one called Matabeleland, which is on the west; and the other Mashonaland, which is to the north-east of it. These were amalgamated in 1895 under the name of Rhodesia.

You know that the administration is under a Chartered Company.

I arrived there shortly after a considerable change had been made; from being absolute rulers of large forces of troops and police, the Chartered Company had been so bereft of power that they were unable to move a man without reference to the British Government, which is represented there by Sir Richard Martin. Settlers in Rhodesia are well pleased and satisfied with Chartered rule; they did not want a change; they would like to see the Charter kept as it is.

When one gets down to Natal one is rather struck by the strong feeling evinced there against the Charter. A prominent politician there said to me "There is no peace in South Africa until that 'ramping lion' is down on its feet"; the ramping lion being the flag of the Chartered Company.

The men in Matabeleland are of course rather biased in favour of Chartered rule, for they have received considerable benefits which they would not have probably received from Imperial rule; for instance there is the compensation, which has been estimated at about £250,000, paid out in connection with the war.

Rhodesians say that no government would have paid that; but they forget to point out that under Imperial rule the necessity for compensation would probably not have arisen.

Then the system under which the Chartered Company help to develop the country is favorable ; if a man wants anything he simply goes over to the Administrators' office, points out what he wants, and the probability is that he will get help.

The government is accessible to all.

Prospectors, instead of having to pay taxes on claims, as in the Transvaal, need only a mining licence. They have no monopolies to contend with.

The Chartered Company reserve to themselves the right to take half the shares on flotation of a mine, and half the profits.

This then is their policy—help in development with taxation of success and not of failure.

I remember Mr. Rhodes telling a story in one of his speeches as to how Rhodesia was "born." He said that the money had to be got from somewhere to form this new country, and then he continued after this fashion : "After we had arranged the amalgamation of the De Beers' mines, each of us who had been in that amalgamation was allowed to run his own little show ; my little show was the extension of the British power up to and north of the Zambesi, and that is how the money was found for it." (Applause.)

Inter alia in return for that money which was lent by the De Beers Company, it is perhaps not generally known that if diamonds should be found anywhere in Rhodesia the De Beers Company get the benefit.

The climate on the higher ground is very good, and quite suitable for white men, but there is a good deal of fever on the low ground.

The African sun is very different from the Indian sun ; it is known that one has to take considerable precautions against the Indian sun and one 'lies low' in the middle of the day : whereas in Africa, even in the middle of the hot weather one works in the hot sun, and really takes no particular precautions, merely wearing a large felt hat.

It is claimed that many parts of Matabeleland are good for agriculture ; some term it 'the future granary of Africa ;' cattle and sheep can be raised ; indiarubber, tobacco, fruit, etc., will be grown, particularly in parts of Mashonaland. There are some magnificent forests to the north-west of Buluwayo, which ought to be a source of wealth, as they contain good teak and mahogany.

South African farms are of enormous size and must not be compared to English farms. It would be useless for an English farmer to attempt farming there. Farms are merely enormous tracts of what is to-day wilderness, or at any rate wildness, which probably none but a man of colonial experience, like a Dutchman, would be able to make pay.

But the question is not whether the agriculture will pay ; it is whether the gold will pay.

Mr. Rhodes in another speech said "the people who went up, expecting to find gold growing on trees, came back disappointed and abused the place." Well, I believe there is gold in many parts, and in some parts it is a good deal easier to find than the trees. That is certainly so round Buluwayo, where it is as bare as this table.

Mr. Rhodes has characteristically ordered a million, however, to be grown.

Will the gold pay or not ? The opinion of Rhodesians is that undoubtedly it will pay in many cases.

Some careful and disinterested persons estimate that two to three per cent. of the mines will pay on a good commercial basis.

The idea that it is a second Rand is exploded ; it is not the Eldorado that people used to try to make it out, but it does not deserve the abuse that has been heaped upon it by disappointed people. I believe that many parts will prove successful both in mining and in agriculture.

The British public must discriminate between the wheat and the chaff ; there is wheat and there is chaff. Whether the British public makes money out of Rhodesia or not, I feel sure that Rhodesia will make money out of the British public.

The unqualified belief in Rhodes is a thing which strikes one very much ; everywhere, all through the country, it is " Mr. Rhodes will do this," or " Mr. Rhodes will do that " ; in fact the enormous necessity for 'The Man of Africa' is extraordinary. Under these circumstances perhaps, before sinking any great amount of money in Rhodesia, it might be well to insure Mr. Rhodes' life, and be safe in any case.

The Johannesburg opinion is rather against it being a gold-mining country. I heard several practical men say " Oh yes ! we know all about gold in Rhodesia, we know it is all played out." Now consider the enormous amount of capital sunk in that land by men who know what they are about, and also that every man who leaves Rhodesia does his level best to get back there again. Those things are very much in its favour.

It is certainly extraordinary that all knowledge of these gold mines should have been lost to humanity for so many years.

When a man goes out in that country to look for gold, he does not go out in the orthodox way with a hammer and pick to chip off bits of rock ; he hunts for old workings. The term ' old workings ' is capacious, and to some wily prospectors includes old wells, brick fields, etc., *caveat emptor.*

Even if it was not an interesting country for anyone else, it is a most remarkable country to antiquarians. The Zimbabye ruins, for instance, repay in interest a journey to Rhodesia.

It is generally thought that the Phœnicians worked those mines ; but whoever it was it is a most extraordinary thing that, if it is such a wonderful gold country, there should be no history or record left of it.

There is probably no alluvial gold left in the country. By alluvial gold I mean gold in nuggets, as opposed to quarried ore. The ancients probably cleared that out. I believe that payable alluvial gold in South Africa varies from alluvial gold in other parts of the world, insomuch that in South Africa it is generally found at considerable altitudes where it has escaped denudation and not, as in Australia and elsewhere, in river beds and recently-deposited plains.

Before its mining and agricultural prospects can be looked at favorably there must be a thorough settlement of the native question, and in many parts of the country a proper consideration of the water supply.

I saw Matabeleland at its very worst ; arriving after two years' locusts, about three years' drought, rinderpest, and the Matabele war.

The rinderpest was perhaps not an unmitigated evil, because it has taken the railway to Buluwayo. I described the difficulties of the road. I can add that the railway will make " Rhod-esia."

Apart from those principal evils, there are one or two minor which might be mentioned.

In the absence of rinderpest they have always the lung disease with them, and cattle suffer to a tremendous extent : after inoculation against this lung disease the tails of the cattle drop off, giving them rather a forlorn appearance.

Then donkeys die of bad keep, and in certain parts of the country there is the Tetse fly. When I left there my young brother had 14 donkeys in work, he has written since to say that they are all dead but three.

Then with mules and horses there is that fearful curse of horse sickness, which extends right down into the north of Natal. From 70 to 80 per cent. of animals afflicted with the horse sickness die. Those that get over it, are termed salted (perhaps connected with being 'Savour' —to buy). If a man in Matabeleland wants to buy a horse, he is not captious as to soundness, nor does he care for age; what he wants to know is if it is salted: in which case he will give £70 or £80 for it, rather than pay £15 for a young sound unsalted animal.

I understand that if horses and mules have proper shed accommodation, if they are fed in the morning before they go out, and if they are not allowed to graze until the grass is dry, then they are less liable to the sickness: also that mares and foals, that are properly looked after in the winter, and not left half-starving on the veldt, are much less liable. February to May are the worst months.

It is rather remarkable to consider that in South Africa, where animals suffer in so many and terrible ways, there seems to be a scarcity of veterinary surgeons. I should think there is a great opening for them there.

The best mules in the country appear to be bred by a Spanish Jack out Cape mares. In Buluwayo I bought four mules for the purpose of going out to the Matoppos, and paid £25 a piece for them. I sold them again for the same money. That was just before the horse sickness came on.

The coach contractor, Zeederberg, told me that he had tried some interesting experiments in zebra crossings with donkeys, in the hope of getting something that would not suffer from horse sickness. He said he could not obtain satisfactory results because the hybrid is too lazy; it cost him more for paying men to flog up the beasts to get work out of them than it cost him to use mules! This also requires 'salting.'

The Cape horse is certainly much wanting in bone, and small, and except in the neighbourhood of the Transvaal one hardly sees a good stamp of horse in South Africa. At Johannesburg, owing to the racing there, a very much better class of horse is being imported.

I might digress again for a moment to point out that it is possible that artillery may be employed in South Africa at no distant date; the question of remounts for the artillery may then come before us, and we might find it expedient to use the horse of the country.

When one considers these small horses, and the fact that scarcely a horse in that country ever wears a collar, reflections which, although rather remote from Africa, are intimately connected with our own particular service, are forced upon one. Consider the enormous weight we put on our draught horses here.

Certainly few Cape horses could carry it. I suppose it *is* realised by everybody that a set of harness in drill order, not marching order, weighs over six stone, and of that the collar averages about sixteen to nineteen pounds. I think that discussion on that point might lead to results in the future, as there are so many considerations in favour of doing as the French and our own colonials have done, abolishing the collar. The new pole harness, where the breeching is easily adaptable as breast harness, favors the idea.

Buluwayo itself is going through the process of sitting tight. When I got there it was very empty, because food was scarce and the country unsafe. The Chartered Company had for some time actually been paying men to go away.

The country was only just on the eve of settling down after the Matabele rising; rumors of fresh outbreaks were constant, and a murder was committed on the outskirts of the town. Steps were taken then to re-organize the residents for defence, and superfluous natives who had swarmed into the town in search of food were cleared out. The native population of Rhodesia, Bechuanaland, and the northern Transvaal, was in the throes of famine and such roots as they could find, locusts, and rinderpest hides, were their chief means of sustenance. Mr. Rhodes and General Sir Frederick Carrington had started for Salisbury, to help to quell the Mashona rising; which rising was still in progress though diminishing rapidly when I left Africa.

As men could not go farming or prospecting, they directed their attention to speculating in land in Buluwayo. Stands are fetching high prices. At the corner which I now point out on the map there is a block which was sold by auction for £3,000, and offers were made to the purchaser within about a fortnight of £4,000. I heard yesterday that a block of land at Salisbury which could have been purchased for a hundred pounds recently, was sold during the last fortnight for seven hundred pounds; such instances are common, and tend to confirm the view that Rhodesia will have its good days soon.

The inhabitants certainly deserve well in the future because they have suffered; necessaries are scarce, luxuries are conspicuous by their absence, and the prices of all things are most prohibitive.

I reckon that it costs one, in food alone, to live in Buluwayo at the present minute about £25 a month. A meal costs 10s. 6d. Mealies (maize, Indian corn), the staple article of food, were about £14 a bag, and could hardly be bought as they were commandeered by the Government for distribution among the starving natives.

Potatoes were sixpence each, eggs were anything from 27s. to 48s. a dozen. A 10-oz. loaf bread was a shilling, with £6 for carriage on a bag of flour. Little or no milk, vegetables, or fresh meat, it can be realized that life in Buluwayo has not been 'a bed of roses.'

There was plenty of drink to be got however. Everywhere in South Africa there is the greatest margin allowed for drink, and no street is complete without drinking bars. The price of whiskey varied from twelve shillings and sixpence to one pound a bottle, but that did not seem to stop its consumption.

It is a very thirsty country.

Apropos of the extraordinary price of eggs, I may mention that at a dinner the dish of the evening, a most expensive dish, was a plain (very plain !) omelette. With eggs at forty-eight shillings a dozen it would cost a good deal to make an omelette sufficient for six people. The charge was made but the wily restaurateur used egg powder.

The town is well laid out, as you see. At present there is not much except these broad avenues, with single rows of stores down three or four of the streets. Out on this side (pointing to the map) there are the suburban stands, the Mayfair of the future.

The houses are fairly well built, when it is considered that everything has had to be taken up on wagons for 600 miles.

Galvanized iron is rather conspicuous everywhere in South Africa,

particularly for roofs; certainly 'made in England,' but not very suitable to hot climates.

In the centre of the town is a fearful dust trap of a Market Square. Here the laager was situated when the town was attacked.

There is a capital club. Unfortunately, owing to rinderpest, the furniture had not arrived.

The men I met in the club were as pleasant a lot of men as one can meet anywhere, and as hospitable; amongst them several who had been in the service. I met an ex-gunner, now president of the Chamber of Mines, and together we held a board on the C.C.'s 7-pr. guns.

There is a good hospital, erected in memory of the Shangani river disaster and the brave men who fell there. Red dust, red bicycles, and a coatless population complete the scene.

Buluwayo, everything considered, is a wonderful place, for in 1893 it was Lobengula's kraal. Government House is built on the spot where Lobengula's house stood.

The very sanguine reports about the termination of all native troubles are to be doubted. It is quite possible there may be another native rising.

But see on this sketch map that forts are now dotted about the country held by police, and with a rapidly-approaching railway a rising can never again assume such serious proportions.

There still remain about 15,000 armed natives; a menace to safety. They have given up some assegais, but firearms, even those belonging to the revolted police, are not easily to be found.

That the settlement is satisfactory is certainly not the case, but it was essential. The fight between natives in the Matoppos and troops without transport may be compared to a fight between a dog and a fish.

The native mind of South Africa has not received the salutary lesson it requires to avenge the many fearful atrocities, and sporadic outbreaks have since occurred elsewhere. The Matabele are not disposed to look upon the war as a defeat, and in some districts are still truculent.

I must refer you to Selous' book "Sunshine and Storm" for the causes of the war, and many interesting details.*

The result of the war is that, although the Matabele have failed to abolish the white man, they have improved their status. But it is absolutely essential for the peace of the country that the natives should be completely disarmed, and we may shortly hear of that question being tackled. The idea in Buluwayo was that when the crops were ready for cutting a raid would be made and firearms obtained, or crops destroyed. However, as the police force there is only 600 men, and as the Matoppo Hills cover a great extent of country, I do not see that is quite feasible.

I might tell you a little story about the Matabele high priest, the M'Limo, who directed the natives so much in their fighting. He told them on one occasion that the white men's bullets and powder were to turn into water, and that they need not mind being fired at as all would go well. The natives attacked the town accordingly, and to the surprise of the force that went out to meet them they allowed a large number of their fellows to be shot down before retreating. At length they turned and bolted. They went to the M'Limo and interviewed him,

* *Vide* also published, since these remarks, books on the war by Col. Baden Powell and Major Plumer.

saying "We understood these bullets and powder were to turn to water." The M'Limo was equal to the occasion, luckily for him. He said, "Show me a white man's bullet." They showed him a Lee-Metford cordite cartridge. He asked them "What is the color of powder?" To which they replied "Black, of course." He cut the cartridge open and then said "Look at this, it is white; I tell you it was turning into water, and if you had only stayed a little longer it would have been all right." (Laughter.)

In the Matabele rising Rhodesians had undoubtedly a tremendously hard time to go through, and deeds of bravery were performed such as probably have not been performed since the Indian Mutiny.

Every colonial considers himself a heaven-born soldier, and I fear that nowhere in South Africa does the Imperial officer and 'Tommy Atkins' command any great respect. Misfortunes have hitherto attended them, but at the same time they were very glad in Buluwayo to see the Imperial troops arrive when they did.

The weapon mostly used appears to have been the Lee-Metford magazine sporting rifle, which is a most accurate shooting weapon, and I can recommend anyone who has not used it to try it.

For the ordinary Indian shooting, black buck, etc., I should consider it a very suitable weapon. It has a bad fault in the half-cocking arrangement, which is liable with cold hands or if mounted to accidentally fire the rifle.

It is serious to consider that the service small-bore bullet failed here, as in Chitral. Men either had to use soft-nosed bullets or to cut slits in the nose of the government ammunition. You doubtless remember that in Chitral soldiers filed down the points of their bullets; this tinkering in both cases being to weaken the fore part of the bullet, so as to facilitate 'setting up' and 'knocking down.' The French in Dahomey and the Italians in Abyssinia found wounds from small-bore rifles so slight that, certainly in the latter case, an idea was prevalent that the ammunition had been tampered with. The natives fired anything and everything from every sort of fire-arm. A bit of telegraph wire was a not uncommon projectile, or the leg of a cooking pot.

It is sad to contemplate that every man on our side who had any limb amputated died, with the exception of Maurice Gifford. I believe that ten per cent. of the available force in Buluwayo, which was under a thousand, before relief arrived was either murdered, killed or wounded during that war; I do not think it is generally realised what a rough time they had.

Though there were many deeds of daring and bravery performed in the defence there are one or two incidents, which if not written will be handed down from mouth to mouth, and which were rather the other way. I will only tell you one, which was amusing.

There was a Jew who was alarmed, like everybody else at the time, to hear that the Matabele were coming in; although the Matabele were some way from the town he started running off to the laager. He rushed out of his house in his pyjamas and slippers and fled down the street. As he passed another man who was leisurely proceeding to the laager, he shrieked "There is a woman in that house; save her!" and on he went. The reply was "All right"; and then he called after the Jew "Who is she?" The answer from the distance came back "She's my wife!" (Laughter.)

There are many more things which I might say about Rhodesia, but I must leave that place as my time is getting short.

From Rhodesia I went to Kimberley, and from there into the Transvaal. There, for the first time for a long period, I saw signs of grass; there had been a little rain, and the green country was very pleasant to the eye. The farms comprise there five or six thousand acres, and every man must have an amount of land quite out of proportion to his stock, otherwise these starve; he has to have summer and winter veldt so as to avoid sickness.

I saw no wood anywhere except the telegraph posts, and I am not sure that they were not iron.

As to the Boer I should say, after having met a good many, that he is a religious agriculturalist, often nomadic. He wants mostly to be let alone; he is very simple, very ungainly, very unkempt and very badly clothed. He smokes greatly, and likes to live as "far from the madding crowd" as possible. He consequently sees nothing, hears nothing, and knows nothing, and apparently washes nothing. He has one failing, or quality, common to Europeans (that satire on government), a strong dislike for taxes, as instanced by the fact that before the Boer War the Transvaal was in a state of bankruptcy, due to the want of payment of taxes.

As for the religious fervour of the Boers—for instance as shewn in President Kruger's speeches—I believe a great deal in that religious fervour. While in Johannesburg their great festival came off, which is called Dingaan's Day. That is celebrated by the Boers because it is the anniversary of the day when in '38 the Zulus were defeated by their forefathers. The Boers before the fight vowed that if they defeated the 12,000 Zulus with their small force of 500, they would keep that as a holy day and celebrate it for ever after; accordingly on Dingaan's day the whole of the Boers in the neighbourhood of Johannesburg and from many other parts collected together.

Let me here point out that the Jameson expedition selected this time and Christmas time, when the Boers could so easily mobilize, for their demonstration; the one time in the year when the Boers can easily be commandeered.

But to return to my story. For a few days before Dingaan's Day Johannesburg was simply a hot-bed of rumours; I never was in such a place for rumours. We were told that we were all to be shot down, and that armed Boers were riding about; we heard that Rhodes was coming in with 5,000 men, and that the Boers on the Natal frontier were shooting down the men in the colony. Every sort of rumour was not only being talked about but was appearing in the newspapers. Another rumour was to the effect that the Young Boer party was going to declare that it would have done with the London Convention on Dingaan's Day.

After all these rumours I thought it very striking that at Dingaan's Day, when the Boers were assembled, the celebration consisted first of a few prayers, and then President Kruger made an address to them. But the whole address contained nothing about politics, nothing about the questions which were agitating everybody there, but simply was a warning against internal dissensions and a prayer for divine help to prevent discord. It was in fact a repetition of Æsop's old fable of the bundle of sticks. Now I thought that to be very striking. (Applause.)

The Boer manages to give the impression of a most contemptuous dislike for the Englishman. The 'verdompt Englander,' he terms him, who, as someone said, if not fighting him is on his track trying to make

money out of him by selling him guns, Bibles, drink, a new constitution or by getting mining rights.

I think this contempt is well illustrated by the following story I heard from an Englishman who had been on the veldt with a Boer wagon. He had received his bundle of English papers, containing news of the Nile Expedition and the capture of Dongola. He read extracts and explained to the Boer's wife, a Natal woman. The old Boer smoked and listened in silence, finally asking that it should be read again. He had evidently mistrusted his hearing for at the close he threw up his hands, exclaiming "Oh God! what manner of men *must* these Dervishes be!" (Laughter.)

We know too well that Boers can shoot too well, probably as they are such good judges of distance. The young generation will deteriorate in this respect as game is scarce, and if rinderpest gets a firm hold will be ended completely.

I wish you to draw a distinction between the Hollander and the Boer. The Hollander, an educated imported class, rules the land; the Boer supports him, more or less.

As you know, there is in one part of the country, the Rand, an Uitlander or foreign population, and a commission has just commenced to sit that will tell you everything about that population and its solid grievances. I do not wish to touch on politics, but to talk of Johannesberg and avoid them is hard. Some of the grievances and actions consequent on them are so ancient that they now constitute history. I may deal with history.

I have already once referred to Veterinary-Captain Nunn's lecture. He was talking of the Indian countrybred, and he summed it up by calling it a "mixed-up animal." I should thus also describe the Uitlander population. I am safe in saying that they are anti-Boer, but I am not quite clear that I can call them Imperial, for consider the flag incident.

More attention to shareholders and less to agitators would suit all parties better. Less 'take' and more 'give' from a bad and unsympathetic government is imperative; in fact a policy of conciliation on both sides, and no tampering with the Convention.

There are mines however which have kept entirely aloof from politics and confined themselves to business. One such shows a profit of £38,000 to £40,000 per month. Here they find no scarcity of labour, apparently no too great taxation, and the £1 shares stand to-day at about £10 or more. Therefore I say that the mines are used as a political lever in many cases.

I was unfortunate in not meeting a man who really wanted a vote. They mostly are but sojourners in the land for amassing wealth, which a number of them have managed to do. The Boers point out that they fought to maintain their autonomy and that to give votes is to give away what they shed their blood for. The solution appears to lie in making the Rand a special district, under some form of local self-government, without conferring on the Uitlanders powers as affecting the Transvaal generally.

No one visiting the country can fail to feel that the present state of affairs is one of great uneasiness. The Boers are undoubtedly 'too big for their boots,' and the question of war is not infrequently discussed. The Boers have made large preparations in case of war. I myself saw a European drill instructor in Johannesburg barracks.

Brave with a religious fervour, which would have been creditable to a Knight Templar or Puritan, splendid shots with a great knowledge of their own methods of fighting, and the country they would fight in and for, they must not be despised.

After a defeat probably they would not rally, but a large force, say 30,000 men or more, would be needed, as nothing must be left to chance: there are too many dark pages in our history of African wars to risk adding another. The force must also be very mobile. The main attack, I imagine, would be by columns from Kimberley and Mafeking with a divertissement against the inevitable Laing's Nek. But, even if successful, how deplorable would such a war be, except to us soldiers. For the Dutch in South Africa, and their motto, like ours, is 'Ubique,' and their name is legion, would be stirred in feelings, if not in action, shaking our African possessions to the foundations, and, involving almost a civil war.

An important element of the situation is to be found in this unhealthy spot—Delagoa Bay. "The key-hole of Africa" it has been termed. Rightly or wrongly, there is an idea out there that Portugal will some day have to go out of South Africa for financial reasons, and the question then occurs as to who will get their big territory? Look at the large slices of map colored German and you look in vain for a port. There, in the middle of that enormous west coast territory, certainly is Walfisch Bay, but it belongs to England. There are many aspirants for Delagoa Bay. The Transvaal wants it very much. The Boers have done all they can to encourage traffic through that port to the detriment of others. They talk of subsidizing a mail shipping service from that port. Delagoa Bay is only 400 miles from Johannesburg and has I believe a 20 per cent. mortality of its unfortunate white population. England, has it is stated, the right of pre-emption, but some bold declaration on her part would perhaps ultimately calm the political atmosphere.

To return to the Transvaal—it is very startling after days of veldt without sign of man's handiwork, to suddenly find oneself entering such a line of tall chimneys and strange looking buildings as can nowhere else be found but on the Rand, and which extend for close on fifty miles. Johannesburg is a precocious infant prodigy; though but nine years old, it is to-day a well-built town full of as bustling a population as one sees in the city of London. Theatres, music halls, clubs, hotels, tramways; in fact all the concomitants of a great city. Johannesburg has all the vices and few of the pleasures of a European town.

The white population almost entirely consist of Uitlanders. Prices are high and the smallest coin in circulation is the 'tickey' as the three-penny-piece is termed.

Once again must I mention scarcity of water. In Johannesburg I had difficulty in getting a small bath; a fire was extinguished in the town by Cape claret, water was too scarce. But the water supply is controlled by a millionaire.

Gold mining and gambling are so often synonymous terms, that one is not surprised to find that in Johannesburg, lotteries, betting houses, etc., and every other form of what may be termed immorals, flourish exceedingly.

The output of gold on the Witwatersrand has improved from year to year. Thus in 1888 the return was 208,122 ozs., while in 1896 it reached 2,280,983 ozs. An easy and interesting way to realize how the average price of shares of the principal gold mines has fluctuated is to

represent it by a curve. Thus, considering the nominal value of shares as one unit, and starting from the middle of 1891, the curve is commenced by two units. From there an almost steady rise until October, 1895, shows the highest point, namely 9. By the end of the year 1895, however, we drop to 5. In 1896 the curve, almost a semi-circle, rises from 5 to 7 in June, and back again to 5 by Christmas, 1896, when I was in Johannesburg.

I have seen it stated that, at an expenditure of under twenty millions the value of this industry through financial cleverness, represent over one hundred and twenty millions.

Ladies and gentlemen, had time permitted, it was my intention to have told you more of this wonderful gold industry, and thence to have carried you on my travels over the battlefields of Boer and Zulu wars.

The subject is almost infinite, the time is very finite. May I therefore conclude my remarks, by asking you to try to apply to lecturers, the advice Delmé Radcliffe gives in "The Noble Science" to horse owners, namely :—

> Be to their faults a little blind,
> But to their virtues ever kind.

(Loud and prolonged applause).

NOTE.—It may be noted that since these remarks were made (March 4th, 1897) the garrison has been largely increased ; the Volunteer and Defence Commission has reported urging reforms ; the Buluwayo railway has reached Tati ; the rinderpest is still spreading ; horses are being purchased in S. America for the Cape ; the Mashona rising and various colony native troubles still exist ; the fleet has gone to Delagoa Bay.

DISCUSSION.

Colonel A. W. White, late C.R.A., S. Africa : Colonel Blaksley, ladies and gentlemen—I came here this afternoon prepared to listen but not to talk myself. Having however been just now expressly asked to say a word or two by way of discussion I feel bound to do so, though the lecturer has mainly avoided debatable ground and thus very wisely left us but little to discuss, and still less to criticise.

I will not at this late hour attempt to follow Lieutenant Levita step by step in his tour through South Africa, suffice it that having gone over much of the country he has described in his interesting lecture, I can testify to the general accuracy of his pictures of people and places and of the everyday scenes of South African life.

Let me however remind you that the lecture deals with an immense geographical area, and that it is essential to recollect that the description of one place or district in South Africa must not be accepted as applicable to every other in that part of the world. As a matter of fact Lieutenant Levita's tour may be fairly compared to that of a stranger to Europe, who starting from London has travelled viâ Berlin and Warsaw to Moscow, returning viâ Vienna and Paris, just in time to catch the outward-bound steamer ; and I suppose there is as much difference between life in Matabeleland and in say Eastern Natal, as there is between life in Russia and in the County of Kent.

And here I will ask the lecturer to forgive me if I take exception to one point : that is his summary condemnation of the chief town of South Africa. That it does not exactly come up to Paris and London is true, but I think he has been too hard upon it. Cape Town is really a fine city, with handsome public buildings and a splendid situation. It is well lighted by electricity, and possesses two excellent local railways, and an electric tram system, which if not ornamental is at least more comfortable and expeditious than our English omnibus service. Cape Town has some ten miles of pleasant suburbs, consisting for the most part of substantial residences in well-wooded private grounds, and surrounded by scenery of exquisite beauty.

As to living in South Africa, we are often told that the food is bad and the cooking worse. In the wilds it can hardly be otherwise, but as regards the towns I think people are misled by judging too much from the hotels and the refreshment rooms of railway stations. These institutions unfortunately exist mainly by and for their liquor bars, and seldom lay themselves out much to please the bonâ fide traveller. Hotel charges are low, usually 12s. 6d. a day inclusive, which in a country twice as expensive as England is too little to command luxuries. The cattle it is true are lean and the poultry ill-fed, hence better cooks are required in South Africa than in England to turn out good dishes ; but then wages are high, and the hotel keepers cannot afford to keep good servants, consequently the hotel dinner is generally indifferent. This impresses the new comer and through-traveller unfavourably, but those who have had time to make a prolonged stay in the civilized parts of Cape Colony and Natal, and especially in the Cape Peninsula, and have experienced the kindly hospitality of colonial society, will agree with me that in South Africa as elsewhere there are plenty of people who know well how to make themselves and their friends comfortable, and that granted a long-enough purse you can generally do yourself almost as well in Cape Town as you can in London.

MR. POULTNEY BIGELOW : I am sure we all feel that we would have liked to hear a very few more words on that most absorbing point on the map of Africa, Delagoa Bay. I think the Speaker was very wise in not having himself made a more intimate acquaintance with it because I had not been more than two days there myself before I was stretched with fever which stayed in my bones for many months, and has not yet got out of them. It is very striking that Delagoa Bay should be such a very unhealthy port, while only one night's journey to the south of it, at Durban, there is a port which twenty years ago was equally unhealthy, but which by the energy and enterprise of those people there is now one of the healthiest places on the coast. and is in fact a health resort in winter. Durban is, I should say, a model town in every respect, excellent roads, excellent public buildings, excellent administration, and a harbour which has now I understand, nineteen feet of water on the average, and can berth the largest steamships which frequent that coast, whereas Delagoa Bay is the most pestiferous swamp that one can imagine, it is run by Portuguese as you know, the so called facilities for landing are practically nil, and the government can only be described as a swindling and a thieving ring. The language I am using is very strong for a Parliamentary gathering like this, but I do not think I have said more than half the truth. (Laughter.)

Any one landing in Delagoa Bay would think he had arrived in some clime where some cataclysm had scattered bales and boxes, water bottles, cartridges, etc., all over the country for miles, and amongst these ruins go little Portuguese officials doing what pleases them, and the man who manages to transport his goods from there to the Transvaal does so by ingenuity which is not common in commercial communities. (Laughter.)

Delagoa Bay is the most magnificient harbour anywhere in Africa ; there is no exaggeration in saying that it is by nature the one harbour in that part of the world. Cape Town has not a natural harbour ; it requires a very exceptional break-water to make it at all safe, and the Harbour at Durban has to be perpetually dredged, although it is now in very fair condition. The river which runs into Delagoa Bay is a beautiful stream where vessels can anchor three to four abreast for a distance of five or ten miles. It is a perfect harbour. The Portugese, however, have done their utmost to make the harbour worthless. They imported a lightship there a short time before my arrival, and the Governor used that lightship part of the time in transporting bricks for a house he was building. He was not particular as to where he left it at night, so that those who were not in the know sometimes landed at the wrong place. (Laughter.)

I think we all feel there will be a row at Delagoa Bay someday, but if that brings me on the verge of politics—and Major Abdy has strictly warned me that this is not a political meeting—I have to thank you for allowing me to say so much. (Loud applause.)

THE CHAIRMAN : If no one else has a remark to make, nothing remains for me but to convey the thanks of the company present to the lecturer for his very able and interesting lecture.

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ABSTRACT OF THE PROCEEDINGS OF THE SIXTIETH ANNUAL GENERAL MEETING OF THE ROYAL ARTILLERY INSTITUTION.

The Meeting was held in the Lecture Theatre, Royal United Service Institution, Whitehall, on Friday, 11th June, 1897. Lieut.-General E. Markham, Inspector-General of Ordnance, took the chair at 3 p.m. and asked the Secretary to read the Report as follows:—

Lectures

During the past season the following lectures were given at the Institution:—

"African Animals," by P. L. Sclater, Esq., F.R.S., 29th October, 1896.

"Röntgen Rays," by W. Webster, Esq., 12th November, 1896.

"The British Army on the Continent of Europe," by T. M. Maguire, Esq., LL.D., 26th November, 1896.

"The Science of Frontier Delimitation," by Lt.-Colonel J. K. Trotter, R.A., 10th December, 1896.

"Consular Experiences in Turkey," by Colonel E. Clayton, R.A., 21st January, 1897.

"The Drift of Service Projectiles," by Captain A. G. Shortt, R.A., 25th January, 1897.

"Nansen and his voyage," by Lieut. Chamberlain, R.N., 7th January, 1897.

"A Cruising Visit to some German Battle-fields," by Poultney Bigelow, Esq., 4th February, 1897.

"Professional Experiences in India," by Vet.-Captain J. A. Nunn, C.I.E., D.S.O., A.V.D., 18th February, 1897.

"Recent travels in South Africa," by Lieutenant C. B. Levita, R.H.A., 4th March, 1897.

"The Total Solar Eclipse of January, 1898," by Captain E. H. Hills, R.E., 11th March, 1897.

"The Cataracts of the Nile," by Major-General Sir W. F. Butler, K.C.B., 18th March, 1897.

The Committee were much pleased that two young officers—Captain Shortt and Lieutenant Levita—acceded to their request to lecture as above; the result in each case was most satisfactory and the Committee hope that the example thus set will encourage young officers to take more part in the lectures than has been the case in recent years.

Lectures at out-stations

Only two lectures were asked for at out-stations; they were one at Dover and one at Shoeburyness, both by W. Webster, Esq., on "Röntgen Rays."

Bideford guns

In the summer of 1896 the Secretary R.U.S.I. asked for any infor-

mation that could be given about some old guns lying at Bideford which were believed by residents to be those from a ship of the Spanish Armada. At the request of the Okehampton authorities Captain P. H. Enthoven, R.H.A. visited Bideford and took measurements of all the guns. He compared these measurements with those of any guns at all like them including, through the kindness of Lord Archibald Campbell, those of known Armada guns at Inveraray and Greenock. After sifting all the evidence he could obtain Captain Enthoven presented a report which showed that, though there was great probability, there was no absolute proof that the guns came from an Armada ship. This report has been published in pamphlet form by the 'Bideford Weekly Gazette.'

Canadian Volunteer Artillery

The officers of the Canadian Volunteer Artillery were made Hon. Members during their stay in England and on the occasion of their visit to Woolwich both officers and men were shown the Rotunda Museum and R.A. Institution.

Special Hon Member

Major-General Sir C. W. Wilson, K.C.B., K.C.M.G., has been elected by the Committee a special Honorary Member and as such presided and spoke at Col. Clayton's lecture.

Publications

The Committee have not issued any works in pamphlet form since the last Annual Meeting; they are about to publish and issue to members an extension (to unit velocity) of the I. and A. columns of the 'Abridged Ballistic Tables' compiled by Professor A. G. Greenhill and Mr. A. G. Hadcock; the Committee hope these tables will prove useful to members who have not books of reference at hand.

Gifts

Of the various gifts received during the past year the most interesting and valuable is the portrait in oils of Colonel Griffith Williams presented by his nephew C. R. Williams, Esq. of Dolmclynllyn, Dolgelly; a description of the picture and its subject was given in the Notes of 'Proceedings' for February of this year.

The copy of Kane's List 1815 presented by Major-General N. W. E. Gosset, C.B. is of great interest and value, as it contains manuscript notes on various distinguished Artillery officers written by his father, Major Arthur Gosset (No. 1682 Kane's List). Some of these notes give information not previously known.

Library

The Committee have added largely to the Library during the past years and thank those members who have called attention to books worthy of purchase.

History of Dress of Royal Artillery

By the time that this report is presented many members should have received a specimen plate of the "History of the Dress of the Royal Artillery" now in course of preparation; a satisfactory sum has been guaranteed and there is every prospect of the book being well received by both the public and the Regiment.

Kane's List

The Committee are proceeding with the republication of Kane's List and feel that they will be forwarding the interests of the Institution in spending some of the funds on this work.

Rotunda Museum

The figures of men in armour in the Rotunda Museum have been completed by Captain C. Orde Browne who has also prepared an illus-

trated description of the figures and their arms; this description was sent to the Secretary of State for War who expressed high approval, ordered it to be bound and deposited in the Institution.

The thanks of the meeting to Capt. C. Orde-Browne for the valuable work he has done in the Rotunda Museum were unanimously voted.

Deaths

Among the deaths are to be noted the names of the following officers :—

General Sir J. Abbott, K.C.B., Col.-Commdt.; Major-Generals W. Tod-Brown, C.B., J. L. Bolton, R. B. McCrea; Colonels E. Lyons, W. Gilbert, C.B., H. H. Murray, F. Howard; Lieut.-Colonels A. J. Anderson, C. E. B. Leacock; Major L. Barrett; Captain H. G. Birch; Lieutenants T. Jones, H. T. Farquhar, C. A. Earle, B. W. Holman, A. A. Boggs and H. G. F. Geary.

Death of Serg.-Major Bryant

Readers of the Notes of 'Proceedings' have learned of the loss sustained by the Institution through the death of Sergt.-Major A. E. Bryant on 6th February. Owing to failing health the Committee had granted him a pension from the funds in addition to his Chelsea pension; he left his employment and residence in the building on the 1st February and died in five days from failure of the action of the heart. The Committee have allowed his widow a sum of £26 a year for four years, at the end of which time her youngest child should have left school; they feel sure the meeting will approve of this mark of their appreciation of the services rendered for more than thirty years to the Institution by Sergeant-Major Bryant.

Duncan Gold Medal 1897

The subject of the Essay for the "Duncan" Gold Medal, 1897, was "Coast Artillery Practice; how best to conduct it with regard to the requirements of actual warfare."

Major-General H. Le G. Geary, C.B., Rear-Admiral A. Douglas, R.N. and Colonel F. G. Slade, C.B., kindly consented to act as Judges. The large number of twenty-five essays were submitted and the Judges recommend that :—

The writer of the essay bearing the motto 'Semper paratus' be awarded the 'Duncan' Gold Medal; that the writers of the essays bearing the mottoes—'The simpler the better' and 'All things are ready if our minds are so' be commended and their essays be published.

In presenting their recommendations, the judges state that they were independently unanimous as to their decision and they think that the essays as a whole bear valuable testimony to the thought and interest officers are taking in their profession in the Garrison Artillery as compared to the lack of interest which prevailed within living memory; further, they think the increased liberality on the part of the War Office has met with its just reward.

The Secretary opened the sealed envelopes and announced that Capt. H. S. Jeudwine, R.A., is the winner of the Gold Medal; Capt. N. W. H. Du Boulay, R.A. and Lieut. C. G. Vereker, R.A. are commended.

Honoraria of Five Pounds were voted to each of the writers of the commended Essays.

Rewards for Papers

Colonel E. T. Browell, Lt.-Colonel F. A. Yorke, R.A., and Captain E. E. Norris, R.A. kindly consented to act as Judges and award amounts as follows :—

Col. F. A. Whinyates (late) R.H.A.	"Letters written by General Dyneley"	£6
Capt. T. D. Pilcher, Northd. Fusilisrs	"Artillery from an Infantry Officer's Point of View" ..	£5
Capt. C. D. Guinness, R.A.	"Artillery positions and screening guns"	£4
Major W. L. White, R.A.	"The Dutch Expedition to the Island of Lombok, 1894" ...	£4
Col. A. E. Turner, C.B., R.A.	"Report on the German manœuvres, 1896" ... ... "The German method of bringing guns into action" ...	£3
Capt. N. W. Du Boulay, R.A.	"The Chino-Japanese War" ...	£3
Major E. G. Nicolls, R.A.	"The duties in 'action' of the Lieut.-Col. commanding a siege train division" ...	£3
C. Dalton, Esq.	"Master-General of the Ordnance in Ireland"	£2
Major J. L. Keir, R.A. ...	"A Plea for Indirect Fire" ...	£2
Capt. J. H. Mansell, R.A.	"The Influence of Ammunition on shooting"	£2
Capt. P. J. R. Crampton, R.A.	"Ranging by clinometer" ... "Artillery and Musketry Fire"	£2
Capt. F. J. S. Cleeve, R.A.	"Considerations on the Subject of Trajectories"	£2
Capt. H. B. Strange, R.A.	"Shrapnel fire of Field Artillery"	£2
Lieut. G. F. MacMunn, D.S.O., R.A.	"The Kashmir Imperial Service Artillery"	£2
Major P. Saltmarshe, R.A. ..	"Competitive Practice in the Garrison Artillery" ...	£2
Major H. C. C. D. Simpson, R.A.	"Mountain Artillery Drill, 1837"	£2
Major O. Rowe, R.A.	"Garrison Artillery Warfare"	£2
Lt.-Col. J. C. Dalton, R.A. ...	"The Battle of Austerlitz" ...	£2

Votes of thanks

The Meeting unanimously voted their thanks to the Judges both of essays and for rewards for kindly undertaking these onerous tasks.

Accounts

The report as above with Appendices was adopted and the accounts as presented in Appendix A. were passed.

The following addition to the Rules was carried *viz.*—

Under the heading 'Language or Science' of the tabular form to add the word 'Travel' in the next line to the words 'Photography, Mechanism and Steam.'

And under the heading 'Proportion' of the same tabular form to insert opposite the word 'Travel' the words 'half tuition fees charged by the Royal Geographical Society, provided the recipient satisfy the Council of the Royal Geographical Society as set forth in their letter dated 22nd March, 1897.'

Two subjects were then chosen for submission to H.R.H. the

President of the Institution, the one selected by him will be announced as that for the Duncan Gold Medal Prize Essay, 1898.

COMMITTEE.

Changes during the past year—

Lt.-Col. J. W. T. Spencer,	vice	Colonel E. T. Browell.
Major E. A. Burrows,	,,	Major E. S. May.
Lt.-Col. F. A. Yorke,	,,	Captain A. Crawford.
Captain E. E. Norris,	,,	,, G. R. Darley.
,, F. J. S. Cleeve,	,,	Major A. C. Hansard.
Major G. H. Bittleston,	,,	Lt.-Col. J. C. Dalton.
,, G. E. Benson,	,,	Major H. J. DuCane

It is now constituted as follows :—

PATRON AND PRESIDENT :

Field Marshal H.R.H. the DUKE OF CAMBRIDGE, K.G.

VICE-PRESIDENTS :

The Inspector-General of Ordnance.
The Deputy-Adjutant-General, R.A.
The General Officer Commanding Woolwich District.

MEMBERS :

The Assistant-Adjutant-General, R.A.
The Director, Artillery College.
The Assistant-Adjutant-General, Woolwich.
The Secretary, Ordnance Committee.

Col. R. D. E. Lockhart.
,, E. Blaksley.
Lt.-Col. J. W. T. Spencer.
,, F. A. Yorke.
,, E. M. Baker.
Major E. A. Burrows.
,, G. N. H. Barlow.
,, H. B. Jeffreys.
Major G. H. Bittleston.
,, H. C. Sclater.
,, G. E. Benson.
Captain W. E. Fairholme.
,, F. J. S. Cleeve.
,, E. E. Norris.
Lieut. L. R. Kenyon.

Bankers :

Messrs. Cox & Co., and London and County Bank.

Solicitor :

E. W. Sampson, Esq., Woolwich.

TRUSTEES :

General Sir C. Dickson, V.C., G.C.B.
,, Sir H. A. Smyth, K.C.M.G.
Lieut.-General R. P. Radcliffe.

Secretary :—Major A. J. Abdy.

APPENDIX C.

Statement shewing Increase and Decrease of Members of the Institution during the year ending 31st March, 1897.

Ranks.	1st April, 1896.	Increase.			Total increase.	Decrease.				Total decrease.	Balance.		31st March, 1897.
		Promotions.	Retirements.	New Members.		Promotions.	Retirements.	Withdrawals.	Deaths.		Decrease.	Increase.	
EFFECTIVE LIST.													
Generals and Field Officers	435	39	—	—	39	—	35	1	4	40	1	—	434
Captains	442	43	—	1	44	39	3	—	—	42	—	2	444
Lieuts. & 2nd Lieuts.	691	—	—	64	64	43	4	—	6	53	—	11	702
Veterinary Surgeons	1	—	—	—	—	—	—	—	—	—	—	—	1
Quarter-Masters ...	1	—	—	—	—	—	—	—	—	—	—	—	1
Riding Masters ...	1	—	—	—	—	—	—	—	—	—	—	—	1
RETIRED LIST.													
Generals and Field Officers	185	—	35	—	35	—	—	15	2	17	—	18	203
Captains	82	—	3	—	3	2	—	2	—	2	—	1	83
Lieuts. & 2nd Lieuts.	18	—	4	—	4	3	—	3	—	3	—	1	19
Paymasters ...	2	—	—	—	—	—	—	—	—	—	—	—	2
Riding Masters ...	1	—	—	—	—	—	—	—	—	—	—	—	1
Medical Officers ...	2	—	—	—	—	—	—	—	—	—	—	—	2
Chaplains	1	—	—	—	—	—	—	—	—	—	—	—	1
Honorary Members.	32	—	—	2	2	—	—	—	—	—	—	2	34
Totals ...	1894	82	42	67	191	82	42	21	12	157	1	35	1928

APPENDIX D.

Presentations to the Library.

Lithographs (coloured)	R.C.D., Nos. 224, 234, 238, 217, 218, 236, and 240 ...	The Secretary of State for War.
	R.G.F., Nos. 160, 160 (No. 2 sheet) and 192	
	R.L., Nos. 230, 233, 234, 235, and 236	
Small Wars: their Principles and Practice, by Captain C. E. Callwell, R.A.		
Extracts from Annual Report of President Ordnance Committee, 1895		

4234	" Balance being surplus of Assets or "Accumulated Fund" at 31st March, 1897.....		4368	13	7	55	" Stocks on hand, viz.: Printing paper.....		
	viz.:—						Books for Sale	45 6 4	
	Surplus at 31st March, 1896.....	4234 1 3				97			91 5 9
	Add—Surplus Income for the year ending 31st March, 1897, as per Expenditure and Income account.	134 12 4				3692	" Investments, viz.: £3739 1s. 9d. Consols at cost.....		3692 8 2
		4368 13 7							
	N.B.—This Surplus is in addition to the value of the contents of the Museum and Library, Instruments, Furniture, Fixtures, &c., belonging to the Institution, which the Committee have estimated at £12,000, and which are insured in the Sun Fire Office for that sum.								
4450			£4559	5	1	4450			£4559 5 1

AUDITORS' CERTIFICATE.

We have compared the foregoing Accounts with the monthly Cash Accounts audited by the Committee and with the books of the Institution and certify the same to be correct. We have also examined portions of the Cash and Ledger Accounts with the Vouchers and have found them in order and have verified the Cash Balances and the Investment in Consols.

ALGAR BATES, & Co.,
Chartered Accountants,

6th May, 1897.

APPENDIX A.

GENERAL ABSTRACT
OF THE
ACCOUNTS OF THE ROYAL ARTILLERY INSTITUTION,
From 1st April, 1896, to 31st March, 1897.

EXPENDITURE AND INCOME.

1895-6 £	Expenditure.	£ s. d.	£ s. d.
138	Printing etc.: Wages—Compositors, &c.	114 4 3	
222	Printing Accounts	82 15 6	
125	Folding, Stitching, &c.	143 13 10	
250	Printing Materials	262 2 10	
192	Wood Engraving and Lithography	195 17 0	
928			798 13 5
37	Classes		0 0 0
134	Lectures		78 18 11
367	Library and Books for Sale		446 16 4
34	Museum		32 2 0
11	Observatory		10 18 6
23	Carpentry and Repairs: Wages	23 9 6	
29	Carpentry and Repairs: Materials	79 11 9	
			103 1 3
12	Stationery		19 4
102	Postage and Parcels		97 10 10
143	Clerks and Orderlies: Wages	151 19 4	
15	Clerks and Orderlies: Clothing	17 16 0	
158			169 15 4
4	Auditors		4 4 0
5	Subscriptions to Societies		5 5 0
33	Fire Insurance		30 10 0
28	Washing and Cleaning		27 16 10
15	Subscriptions refunded		9 10 0
5	Collecting Woolwich Bills, and Christmas Boxes		4 7 6
72	Medals, Honoraria and Rewards		96 7 0
	Arrears of Subscriptions written off		7 1 0
	Bonus to Sergt.-Major Bryant		15 0 0
	Grant to War Game Committee		2 0 0
	Paid for Phillips Memorial		5 2 8
			1945 19 11
	Balance being surplus of Income for the year ending 31st March, 1897		134 12 4
2004			£2080 12 3

1895-6 £	Income.	£ s. d.	£ s. d.
97	Printing	118 15 3	
224	Amount charged to Members for Books, &c.	261 15 0	
29	Amount charged to Members for Postage and Parcels	29 19 3	
1	Amount charged to Members for Carpentry	0 0 0	
353			410 9 6
87	Entrance Fees and Subscriptions for 1896-97. Entrance Fees—Received	71 0 0	
			87 0 0
1446	Subscriptions—Received	1460 2 6	
15	Subscriptions—Outstanding	32 16 6	
1548			1563 19 0
99	Dividends for a year on £3739 1s 9d. Consols less Income Tax		99 8 0
1	Interest on Bank Deposit Account to 5th October, 1896		1 13 3
	Received for Phillips Memorial		5 2 6
2004			£2080 12 3

APPENDIX B.

BALANCE SHEET.—31st March, 1897.

1896 £	Dr. Liabilities, &c.	£ s. d.	£ s. d.
185	To Sundry Creditors viz.: Accounts for goods, Printing, &c., owing by the Institution and included in Expenditure for the year 1896-7	163 15 10	
10	Amount to Credit of Members on current Accounts	8 19 8	
195			172 15 6
21	„ Members' Subscriptions paid in advance		17 16 0
216			190 11 6
4234	„ Balance being surplus of Assets or "Accumulated Fund" at 31st March, 1897		4368 13 7
	viz.:—		
	Surplus at 31st March, 1896	4234 1 3	
	Add—Surplus Income for the year ending 31st March, 1897, as per Expenditure and Income account.	134 12 4	
		4368 13 7	
	N.B.—This Surplus is in addition to the value of the contents of the Museum and Library, Instruments, Furniture, Fixtures, &c., belonging to the Institution, which the Committee have estimated at £12,000, and which are insured in the Sun Fire Office for that sum.		
4450			£4559 5 1

1896 £	Assets.	£ s. d.	Cr. £ s. d.
491	By Cash in hand and at Bankers, including £300 on Deposit Account at Interest		599 0 4
121	„ Sundry Debtors, viz.: Amount owing by Members on current Accounts, included in Income	123 10 10	
48	Amount owing by Members for subscriptions included in Income	53 0 0	
169			176 10 10
42	„ Stocks on hand, viz.: Printing paper	45 19 5	
55	Books for Sale	45 6 4	
97			91 5 9
3692	„ Investments, viz.: £3739 1s. 9d. Consols at cost		3692 8 2
4450			£4559 5 1

AUDITORS' CERTIFICATE.

We have compared the foregoing Accounts with the monthly Cash Accounts audited by the Committee and with the books of the Institution and certify the same to be correct. We have also examined portions of the Cash and Ledger Accounts with the Vouchers and have found them in order and have verified the Cash Balances and the Investment in Consols.

ALGAR BATES, & Co.,
Chartered Accountants,

6th May, 1897.

Rifle and Carbine Exercises, Martini Breech Action, 1896	The Secretary of State for War.
Infantry Sword Exercise, 1896	
Signalling Instructions, 1896	
Infantry Drill, 1896, 6 copies	
Annual Report of the Army Veterinary Department, 1896	
Field Artillery Drill, 1896	
Equipment Regulations, 1896: Garrison Artillery Details	
Allowance Regulations, 1896	
Report on the Mobilization of the 1st Brigade 1st Division 1st Army Corps	
Militia Regulations, 1896	Deputy-Adjutant-General Royal Artillery.
Army (Annual) Act, 1896	
Royal Warrant for Pay, &c., 1896... ...	
Treatise on Service Explosives, 1895 ...	
Regulations for Army Medical Services, 1896	
Musketry Instructions: Lee-Metford Rifle and Carbine, 1896	
Rifle and Carbine Exercises: Lee-Metford, 1896	
Map to Illustrate the Operations of the Unyoro Field Force, Intell. Div., No. 1146 ...	Director of Military Intelligence.
Map of the Niger Coast Protectorate, Intell. Div., No. 1135	
Map of the Nile Valley between Wadi Halfa and Ambugol, Intell. Div., No. 1067 ...	
Map of the Nile Valley between Absarat and Firket, Intell. Div., No. 1180	
Map of Matabeleland, Intell. Div., No. 1166...	
Map of the Nile from Koyeka to Merowi, 3 sheets, Intell. Div., No, 1163	
Map of the Nandi Country, Intell. Div., No. 1169	
Catalogue of Maps in Books and Periodicals contained in the Library of the War Office	
Notes on German Cavalry, by Captain Douglas Haig, 7th Hussars	
Précis of the Italian Musketry Regulations, 1895, by Captain H. H. Wigram, Scots Guards	
Précis of the French Musketry Regulations, 1895, by Captain H. H. Wigram, Scots Guards	
Examination Papers, Volunteer Artillery, Nov., 1896, Papers A to J	
Report on 15th Senior Class, 3 copies ...	Director-General of Military Education.
India Office List, 1896	India Office.
The Quarterly Indian Army List, January, 1896	

Particulars of Rifled Guns and Howitzers, 6 copies	Inspector-General of Ordnance.
Regulations for the Royal Artillery in India, 1896	Inspector-General of Artillery in India.
Examination Papers, R.M. Academy, June, 1896	The Governor R. M. Academy.
The Composition of Expired Air, and its Effects upon Animal Life, by J. S. Billings, M.D., &c.	Smithsonian Institution.
Smithsonian Contributions to Knowledge, Vols. XXX., XXXI. and XXXII. ...	
Smithsonian Miscellaneous Collections, Nos. 1031, 1033 and 1037...	
Netherlands Artillery Atlas, 10 Plates ...	Netherlands Goverment.
Reduction of Greenwich Meteorological Observations, Part III., Temperature of the Air, 1841–1890	Astronomer Royal.
Report of the Astronomer Royal to the Board of Visitors, 1895–6	
Greenwich Magnetical and Meteorological Observations, 1893	
Tests of Metals, &c., 1894	Chief of Ordnance U.S. Ordnance Department.
Index of Publications, Articles and Maps relating to Mexico in the War Department Library, United States	Secretary of War United States.
Lectures on "Position Batteries of Volunteer Artillery," by Captain F. E. Cooper, R.A., and "Coast Defence," by Captain F. M. Lowe, R.A., 12 copies	The Council National Artillery Association.
Proceedings of the Institution of Civil Engineers, Vols. CXXIV. and CXXV. and List of Members, &c.	Institution of Civil Engineers.
The 13th Annual Report of the Bureau of Ethnology	The Director, Bureau of Ethnology.
Transactions of the Institution of Junior Engineers, Vol. V., 1894-5	The Council.
Journal of the Iron and Steel Institute, No. 1, 1896	
General Report of the Practice, Royal Artillery, Bengal Command, 1895-6... ...	Brigadier-General R.A. Bengal Command.
The Trial of the "Jowa" Plate at Indian Head, September, 1895, and Krupp's Trials of 80^{mm} and 100^{mm} Armour Plates at the Proving Grounds near Meppen, October, 1895. Extract from an Article by Captain J. Castner, first published in "Stahl und Eisen," April 1st, 1896	Die Redaction Von Stahl und Eisen.
The Rifle Brigade Chronicle, 1890-95, 6 vols..	Major W. Verner, R.B.
Les Fortifications du Chevalier Antoine de Ville, 1 vol., Alton, 1640	Lieut. D. McKay, R.A.

Guns and Cavalry: their Performances in the Past and their Prospects in the Future, by Major E. S. May, R.A.	Major E. S. May, R.A.
Geschichte der Explosivstoffe, Von S. J. Von Romocki, 2 vols.	
Hand-book for Light Artillery, by 1st Lieut. A. B. Dyer, 4th U. S. Artillery... ...	
Ordnance and Gunnery, by Capt. L. L. Bruff, Ord. Dept., U.S. Army	
Studien über den Taktischen Inhalt, von Carl Regenspursky	
Water Colour Painting—"The Drum Major of the Royal Artillery"—drawn from a coloured print by A. Comer, 1st Dragoon Guards, in possession of the R.A. Library, by Lieut. R. J. Macdonald, R.A. ...	Lieut. R. J. Macdonald, R.A.
Taschenbuch für R. und R. Artillerie Officiere, 1895	Major H. C. C. D. Simpson, R.A.
Reglement sur le Service des Batteries de 80 de Montagne, 1890	
Instructions sur le Service et L'Emploi de L'Artillerie de Montagne, 1889 ...	
Instruction pour les Convois Alpins dans L'Armée Italienne, 1890	
The Officers Guide to Campaigning Equipment: How, Where and What to Obtain, by Lieut. Dudley Seagrim, R.A.	Lieut. D. Seagrim, R.A.
Description of and Instructions for Working the Chronograph of Boulenge Type, as modified and improved by Captain H. C. L. Holden, R.A., 2 copies	Major Holden, R.A.
Patents for Inventions relating to Machine Guns and Automatic Breech-Mechanism, by W. R. Lake	Major F. G. Stone, R.A.
Traité des Sieges sur L'Attaque et la Defense des Places de Guerre, par M. De Vauban, March, 1727	Lieut. C. H. Chepmell, R.A.
Two MS. Books, by Genl. De Maignac, dated 1792–3	Lt.-Col. J. Percy Groves.
The Loss of Horses in War, by Vet. Capt. F. Smith, A.V.D.	Vet. Captain F. Smith.
Parchment Commissions of Edward Stehelin as 1st Lieutenant of the Royal Artillery, dated 7th July, 1779, and of William Stehelin as 2nd Lieutenant of the Royal Artillery, dated 6th November, 1776 ...	Col. E. Broadrick, *late* R.A.
MS. Return of Ordnance, Carriages, Powder, Shot, and Other Stores at Tilbury, on 10th January, 1664	Maj.-Genl. Sir C. T. du Plat, K.C.B., *late* R.A.
Important Facts and Calculations for the Consideration of Astronomers and Geologists, by Major-General A. W. Drayson, *late* R.A.	Major-Genl. A. W. Drayson.

Report on the Curragh District Manœuvres, 1896	Captain P. J. R. Crampton, R.A.
Two Indian Campaigns in 1857–58, by Colonel E. T. Thackeray, V.C., C.B., *late* R.E. ...	Colonel E. T. Thackeray, V.C., C.B., *late* R.E.
Questions and Answers on Gunnery, 4th Ed., by Major F. W. Panzera	Major F. W. Panzera.
Suite au Mémoire sur un Nouveau Systéme de Bouches a Feu Démontables, Publié en 1891, par Pierre S. Lycoudis, Lieut.-Colonel du Génie, Armée Hellénique	Lieut.-Col. Lycoudis.
The Colonel and his Command, by Julian Corbett	Julian Corbett.
Twenty-six R.C.D. Drawings	Captain M. B. Lloyd, R.A.
English Army Lists and Commission Registers, 1661–1714, Vol. III., 1689-1694 ...	C. Dalton, Esq., F.R.G.S.

MAPS.

1. Détails des Fortifications de Terre du Côté Sud, by General Todleben, St. Petersburg, 1863	T. M. Maguire, Esq., LL.D.
2. Siége de Sebastopol-Guerre de Mines, by General Niel, 1858, Plates 13 and 14 ...	
3. Siége de Sebastopol, Plan D'Ensemble des Tranchées, Plate II., bis, by General Niel, 1858	
4. Siége de Sebastopol, Détails des Fortifications de Sebastopol, Plate III., by General Niel, 1858	
Plan des Batteries de Côte de la Rade de Sebastopol, by General Todleben, St. Petersburg, 1863	
Portrait of the late Benjamin Waterhouse Hawkins, F.L.S., F.G.S. (framed in oak) ...	Miss Hawkins.
Coloured print "L'Aimable Prussien" ...	Miss G. B. Abdy.
Oil Portrait of Colonel Griffith Williams, R.A.	C. R. Williams, Esq.

APPENDIX E.

BOOKS, &c. PURCHASED.

Biologia Centrali-Americana, Zoology, Parts 129-131, Archæology, Part 6.
Album Militaire 1st Series, Parts 11 to 15. 2nd Series, Parts 1 to 3.
Naval and Military Trophies. Parts 1 to 4.
Militar Hand Worterbuck für Armée u Marine. Parts 11 to 31.
L'Armée Belge. Parts 1 to 6.
Dictionary of National Biography. Vols. 47, 48 and 49.
Dictionnaire Militaire. Parts 6 and 7.
A Military Dictionary. By Major-General G. E. Voyle.
A Military Dictionary. By J. Watson, 1758.

Navy Records Society's Publications, 1896—"Journal of Admiral James," "Holland's Discourses of the Navy" and "Accounts and Inventories of Henry II."
Grands Artilleurs, Drouot-Senarmont-Eblé. Par Maurice Girod de L'Ain.
L'Armée Francaise Annuaire, Illustré. Par Roger de Beauvoir.
Précis des Campagne de Gustave-Adolphe, en Allemange, 1630-1632. Bruxelles 1887.
The War of American Independence 1775-1783. By J. M. Ludlow.
Greater Britain. By Sir C. W. Dilke, Bart.
Moltke's Militarische Korrespondenz. Part 2.
The Royal Military Chronicle, or British Officer's Monthly Register and Mentor. Vols. 1, 3, 4, 6 and 7.
Atlas de la Monarchie Prussienne. 1 Vol.: London, 1788.
La Guerre en Rase Campagne. Par le Capitaine Danrit. 2 Vols.
La Guerre de Fortresse. Par le Capitaine Danrit. 2 Vols.
Memoires De Barras. Vols. 3 and 4.
Annuaire de L'Armée Francaise, pour 1896.
Moltke's Militarische Werke. Part 3, Vols. 2 and 3.
Erinnerungen aus dem Leben des General-Feldmarschalls. Hermann von Boyen. 3 Vols.
La Cavalerie Francaise. Par le Capitaine H. Choppin.
Mémoires du General Rapp, 1772-1821. Par Desiré Lacroix.
Notes of Conversations with the Duke of Wellington, 1831-1851. By Earl Stanhope. 4th Edition, 1889.
Une Famille D'Artilleurs: "Memoires de Louis-Auguste Le Pelletier."
The Heart of a Continent. By Capt. F. E. Younghusband, C.I.E.
Souvenirs du Maréchal Macdonald, Duc de Tarente. Par M. Camile Rousset.
Le Maréchal Ney, 1815. Par Henri Welschinger.
The Naval Annual, 1896.
Mémoires Militaires du Baron Séruzier, Colonel D'Artillerie Légére.
Un Régiment á Travers L'Historie le 76 ex 1ª Léger. Par le Commandant Du Fresnel.
Rupert of the Rhine. By Lord Ronald Gower.
Charles van Schorel de Wilryck, ou Le Fauldés Belge.
Torpedoes and Torpedo-Vessels. By Lieut. G. E. Armstrong, late R.N.
Gustavus Adolphus: A History of the Art of War, etc. By T. A. Dodge.
Enfant Perdu, 1814. Par Gustave Toudouze.
Persia Revisited, 1896. By General Sir T. E. Gordon, K.C.I.E., etc
Manual of Hydraulics for Garrison Artillery, 1895.
Life of General Sir Hope Grant. By Colonel H. Knollys, R.A. 2 Vols.
L'Armée Suisse, Illustrations de D. Estoppey. 1 Vol., Genéve, 1894.
Etudes Pratiques de Guerre, Vol. 2. Par Général Lamiraux.
Le Panorama Salon, 1896. No. 7.
Mesure Directe des Pressions dans les Bouches a Feu. Par Capitaine Gosselin.
Memoir of the Operations of the British Army in India during the Mahratta War of 1817-18 and 1819, 1 Vol. Maps. By Lieut.-Colonel V. Blacker.
Narrative of the Siege and Capture of Bhurtpore. By Captain J. N. Creighton.
An Account of the Kingdom of Cabul and its Dependencies in Persia, Tartary and India. By the Hon. M. Elphinstone.
Narrative of the Peninsular War, from 1808 to 1813. By the Marquess of Londonderry, G.C.B. 2 Vols.
Lady Jane Grey and her Times. By G. Howard.
Thirty Years in India. By Major H. Bevan. 2 Vols.

Day by Day at Lucknow: A Journal of the Siege of Lucknow. By Mrs. Case.
Camp and Barrack-room: or the British Army as it is. By a late Staff-Sergeant of the 13th Light Infantry.
Narrative of a Journey Round the World. By F. Gerstaeker. 3 Vols.
A Voyage to Cadiz and Gibraltar, up the Mediterranean to Sicily and Malta in 1810-11. By Lieutenant-General Cockburn. 2 Vols.
Voyages to the East Indies. By the late J. S. Stavorinus. 3 Vols.
Chromo-lithograph of R.A. Barracks Woolwich.
View of the Russian Empire during the Reign of Catherine II. By William Tooke, F.R.S. 3 Vols.
Admiral of the Fleet, Sir Geoffrey Phipps-Hornby, G.C.B.: A Biography. By Mrs. Fred Egerton.
A Travers la Bulgarée. Par Dick de Lonlay.
Memoires du General Lejeune. 2 Vols.
The Battle of Custozza: A Tactical Study. By General Verdy du Vernois.
Itinéraire Illustré de L'Epopée de Waterloo. Par Georges Barral.
Die Entwickelung der Deutschen Festungs und Belagerungsartillerie, par H. von Müller.
Geschichte des Koniglich Preussischen Feldartillerie-Regiments, No. 15, von Lieutenant Jung.
Arundel Society's Publications, "The Nativity of the Virgin."
Text-book of Ordnance and Gunnery. By Captain L. L. Bruff, United States Ordnance Department.
Carnet de L'Officier de Marine, 1896.
A Travers L'Europe, Croquis de Cavalerie. Par L. Vallet.
Carnet Aide-Mémoire de Poche a L'Usage des Sous-Officiers D'Artillerie 1896.
Carnet Aide-Mémoire de Poche a L'Usage des Officiers D'Artillerie, Nos. 1, 2 and 3. 1896.
La Défense de Torgau en 1813. Par Fernand le Ploge.
Travaux de Campagne. Par Lieut.-Colonel E. Hennebert.
Communications Militaires. Par Lieut.-Colonel E. Hennebert.
Schlachten Atlas. Parts 49-52.
Two Campaigns: Madagascar and Ashantee. By Bennet Burleigh.
Précis de Quelques Campagnes Contemporaines. Par le Commandant E. Bujac. Vol. 2.
The Volunteer and Intelligent Soldier's Companion, 1803.
Patriotic and Military Instructions Addressed to the People of England, 1780.
The Art of Fortification Delineated. By J. Dinsdale (translated).
An Account of the Isle of Jersey. By P. Falle, M.A., dated London, 1694.
Life and Diary of Colonel J. Blackader. By A. Crichton, dated Edinburgh, 1824.
Narrative of the Expedition under Brigadier-General Craufurd, &c., dated London, 1808.
Pen and Pencil Sketches; being the Journal of a Tour in India. By Captain Mundy. 2 Vols. London 1833.
Two Coloured Engravings Illustrating a Dragoon Encampment at Brighton and Uniforms of the Period. By Wheatley.
Three Water-colour Drawings of Royal Artillery at Gun Drill, period about 1840.
Four Lithographic Engravings of R.H.A. and R.A. Guns at the Funeral of the late Duke of Wellington.
Two Lithographic Coloured Prints of "Royal Artillery." Campion series.
Notes on Organization and Equipment. By Lieut.-Col. Brunker, *p,s.c.*, 1896.
Steam. By William Ripper, 1895.

Coloured Print—"The Artillery Driver."
Ninety-nine Coloured Military Prints.
L'Armée Russe. Par MM. de Jongh Fréres.
Guerre et Paix, De Tolstoi au Point de Vue Militaire. Par le General Dragomiroff.
Map of North-eastern China.
Elementary Manual on Applied Mechanics. By A. Jamieson.
Photograph of the Monument Erected to the Memory of the Officers and Men who fell at the Battle of Rangariri, New Zealand, 20th November, 1863.
History of the German Struggle for Liberty. By Poultney Bigelow, B.A. 2 Vols.
The Crimea in 1854 and 1894. By General Sir E. Wood, V.C., etc.
Journal du Maréchal de Castellane 1804-62. Vols. 1 and 2.
Battles and Battlefields in England. By C. R. B. Barrett.
Hakluyt Society's Publication for 1896: "History and Description of Africa." 3 Vols; and "Discovery and Conquest of Guinea." Vol. 1.
L'Album d'un Saint-Cyrien.
Général Du Barail. Mes Souvenirs. 1820-1871. 2 Vols.
La Vie Militaire du Général Ducrôt, 1839-1871. 2 Vols.
Manual and Platoon Exercise, 1804.
A Treatise of Military Discipline. By H. Bland, 1762.
A Dictionary of the Military Science. By Lieutenant E. S. N. Campbell, 22nd Regiment, 1844.
Historical Account of the Services of the 34th and 55th Regiments. By Qr.-Mr.-Sergt. G. Noakes, 1875.
A Treatise Containing the Elementary Part of Fortification. By John Muller, 1756.
General Regulations and Orders for the Army, 1811.
Rules and Regulations for the Formations, Field Exercise and Movements of H.M. Forces, 1808.
The Regimental Companion. Vol. 1. By C. James, 1811.
The Military Sketch-book. 2 Vols. 1827.
Army Service Act and Mutiny Act, 1847 and 1855.
A Treatise on the Duty of Infantry Officers and the Present System of British Military Discipline. By T. Reide, 1798.
Le Vélocipédiste Militaire Petit Manual.
English Army Lists and Commission Registers. By C. Dalton, F.R.G.S. Vol. 3.
Gall's Modern Tactics and Supplement 1897.
Inkstand with Silver Top made from a Glass Grenade taken at the Great Redan, Sebastopol; by Capt. S. D. Broughton, R.A. with a Granite Stand made from a piece of Granite from the Dock at Sebastopol.
Coloured Figures of the Eggs of British Birds. By H. Seebohm.
A History of British Birds. By H. Seebohm. 4 Vols.
Catalogue of Birds. Vols. 24, 25 and 27.

APPENDIX F.

Presentations to the Museum.

Water Jug taken from King Prempeh's bedroom Kumassi, 1896, believed to be of Dutch manufacture with peculiar stopper of native make, with cannon on top, gold gilt, silver chain and label, inscribed Kumassi, 1896. Presented by Lieut. Dudley Seagrim, R.A.	Lieut. D. G. Seagrim, R.A.

Imperial Eagle and N.N., removed from the flag-staff of Toulouse Arsenal, by the gunners under Sir A. Dickson in 1814	Genl. Sir C. Dickson, V.C.
Six blow pipes with two mouthpieces and a bamboo quiver containing poisoned arrows, from the Malay Peninsula	Lieut. W. Jennings, R.A.
Chinese spear.	Capt. N. W. H. DuBoulay, R.A.
Bit used by Guachos in Argentina ...	Major J. J. Porteous, R.A.
6-inch armour piercing shot, forged steel, (No. 1) round 2963, shot stamped, $\frac{37}{3}$ (b) ...	The Supt. Royal Laboratory.
Tinder box with flint	Capt. J. W. Ormiston, R.A.
A collection of dried plants from Stirlingshire.	Col. J. S. Stirling, *late* R.A.

DEPOSITED.

Two "Coco-de-mer" from the Seychelles Islands; 1 rough and 1 polished ...	Genl. Sir R. Biddulph, K.C.B., G.C.M.G.
Model of a record target, designed by Captain W. E. Donohue, R.A.	Capt. W. E. Donohue.

APPENDIX G.

List of Papers Published in the "Proceedings," during the Year.

A plea for indirect fire. By Major J. L. Keir, R.A.

The influence of ammunition on shooting. By Captain J. H. Mansell, R.A.

Bayard's armour. By Captain Orde Browne, *late* R.A.

Artificial Illumination. By Professor Carlton Lambert, M.A.

A Suggestion for firing "Puffs" for training observers. By Captain C. S. Vores, R.H.A.

Garrison artillery warfare. By Major O. Rowe, R.A.

Artillery and musketry fire. By Captain P. J. R. Crampton, R.A.

Considerations on the subject of trajectories. By Captain F. J. S. Cleeve, R.A.

The Battle of Austerlitz. By Lieut.-Col. J. C. Dalton, R.A.

The causes of drift of elongated projectiles fired from rifled guns. By Major-General C. H. Owen, *late* R.A.

A Visit to Persia. By Major J. F. Manifold, R.A.

Artillery from an infantry officer's point of view. By Capt. T. D. Pilcher, Northumberland Fusiliers.

Master-General of the Ordnance in Ireland. By Charles Dalton, Esq.

Ammunition columns and parks, considered with reference to the replacement of ammunition, horses and men during and after an action. (Duncan Gold Medal Prize Essay, 1896.) By Captain J. F. Cadell, R.A.

Ammunition columns and parks, considered with reference to the replacement of ammunition, horses and men during and after an action. (Silver Medal Prize Essay, 1896.) By Lieutenant G. F. MacMunn, D.S.O., R.A.

Ammunition columns and parks, considered with reference to the replacement of ammunition, horses and men during and after an action. (Commended Essay, 1896.) By Major E. S. May, R.A.

Abstract of the Proceedings of the Fifty-Ninth Annual General Meeting of the Royal Artillery Institution..

Alterations of the clothing of the Royal Artillery in India. By Colonel A. B. Stopford, A.-A.-G. R.A. in India.

The Chino-Japanese War. By Captain N. W. H. Du Boulay, R.A.

Letters written by Lieut.-General Thomas Dyneley, C.B., R.A., while on active service between the years 1806 and 1815, arranged by Colonel F. A Whinyates, *late* R.H.A.

Optical instruments and silvering glass surfaces. By Dr. A. A. Common, LL.D., F.R.S.

Mess management. By Major J. Hotham, R.H.A.

An examination of the R.A. Seniority and Distribution Lists for March 1896. By Lieutenant H. L. Griffin, R.A.

Shrapnel fire of Field Artillery. By Colonel E. Bainbridge and Captain H. B. Strange, R.A.

Ranging by clinometer. By Captain P. J. R. Crampton, R.A.

Flight and flying machines. By Dr. G. H. Bryan, F.R.S.

Astronomical problems. By Lieut.-Colonel H. H. Crookenden, R.A.

The Kashmir Imperial Service Artillery. By Lieutenant G. F. MacMunn, D.S.O., R.A.

Notes on Austrian artillery. By Lieut.-Colonel de C. Daniell, R.A.

The Coast Defences of Northern Tunis. By Major H. C. C. D. Simpson, R.A.

Range Officer. By Lieutenant H. L. Griffin, R.A.

Competitive practice in the Garrison Artillery and its effect on the training of officers and men. By Major P. Saltmarshe, R.A.

The Dutch expedition to the Island of Lombok, 1894. By Major W. L. White, R.A.

Statistics of the siege of Sebastopol. Communicated by the Secretary.

Report on the German manœuvres of the XIV. German army corps in Baden September 1896. By Colonel A. E. Turner, C.B., A.-A.-G., R.A.

African animals. (Précis of a lecture delivered at the R.A. Institution, Woolwich.) By P. L. Sclater, Esq., F.R.S., Secretary Zoological Society, London.

The duties in 'action' of the Lieut.-Colonel commanding a siege train Division. By Major E. G. Nicolls, R.A.

Artillery from an infantry officer's point of view. A criticism. Communicated.

A two months' trip into Mongolia. By Lieutenant C. N. Buzzard, R.A.

Artillery positions and screening guns. By Captain C. D. Guinness, R.A.

Formula for finding speed of objective. By Lieutenant F. Brown, I.O.M., R.A.

A plea for speed in firing with Garrison Artillery Guns. By Major-General J. B. Richardson.

The German method of bringing guns into action. By Colonel A. E. Turner, C.B., A.-A.-G., R.A.

Colonel James Wemyss, Master-Gunner of England, 1638-1666, and General of the Artillery in Scotland, 1649-1667. By Charles Dalton, Esq., *Editor of English Army Lists and Commission Registers, 1661-1714.*

Captain Bogue and the Rocket Brigade. Communicated by Colonel F. A. Whinyates, late R.H.A.

Mountain Artillery Drill, 1837. By Major H. C. C. D. Simpson, R.A.

APPENDIX H.

Precis and Translations Published during the Year.

FRENCH	"Revue Militaire de L'Etranger." The military cycle in Germany. By Lieut.-Colonel J. H. G. Browne, *late* R.A. "Revue Militaire de L'Etranger." Firing at Captive Balloons. By Lieut.-Colonel J. H. G. Browne, *late* R.A. "Revue d'Artillerie." New Russian regulations regarding the tactical and fire discipline of the brigade division. By Lieutenant H. W. Taylor, R.H.A. "Journal de Genève." The effect of electricity on the flight of projectiles. By Captain W. C. Hunter-Blair, R.A.
GERMAN	"Militär-Wochenblatt." The fire of artillery at manœuvres. By Colonel A. E. Turner, C.B., A.-A.-G., R.A.
RUSSIAN	"Russian Artillery Journal." Ammunition supply in the field. By Major E. A. Lambart, R.A.
SPANISH	"The Memorial de Artillería, Madrid." October and November, 1895. A Review. By Lieut.-Colonel J. C. Dalton, R.A.

APPENDIX I.

LIST

OF

FOREIGN MAGAZINES AND JOURNALS

TAKEN IN BY THE

R.A. INSTITUTION;

WITH THE NAMES OF OFFICERS WHO HAVE UNDERTAKEN TO SUPPLY PRÉCIS AND REVIEWS OF THEIR CONTENTS FROM TIME TO TIME.

COUNTRY.	NAME OF JOURNAL, &c.	TRANSLATOR.
France	Spectateur Militaire	—
	Journal des Sciences Militaires	Major J. F. Manifold.
	Revue d'Artillerie ...	Lt.-Col. F. E. B. Loraine, late R.A.
	Revue Militaire de l'Etranger	Lt.-Col. J. H. G. Browne, late R.A., and Major E. J. Granet.
Spain	Memorial de Artillería ...	Lt.-Col. J. C. Dalton.
	Revista Técnica de Infanteria y Caballeria	—
Germany	Neue Militärische Blätter ...	Capt. A. B. Denne.
	Archiv für die Artillerie-und Ingenieur-Offiziere	2nd Lt. A. M. Seton.
	Militär-Wochenblatt... ...	Major E. S. May.
	Jahrbücher für die Deutsche Armee und Marine	—
Austria	Organ der Militär-Wissenschaftlichen Vereine	—
	Militärische Zeitschrift ...	—
	Mittheilungen, &c., des Artillerie und Genie-Wesens	Major L. C. M. Blacker.
Italy	Rivista di Artigleria e Genio	Major R. M. B. F. Kelly.
	„ Marittima...	—
Russia	Journal of Artillery...	Major E. A. Lambart. Major G. T. Kelaart.
	Russki Invalid	Lieut. E. G. Cheke.
	Oruzhennii Sbornik	Capt. E. A. Campbell.
Sweden	Artilleri-Tidskrift	—
	Tidskrift Sjöväsendet ...	—
Roumania	Cercul Publicatiunilor Militare	—
Brazil ...	Revista Maritima Brazileira ...	—

COAST ARTILLERY PRACTICE; HOW BEST TO CONDUCT IT WITH A VIEW TO THE REQUIREMENTS OF ACTUAL WARFARE.

BY

CAPTAIN H. S. JEUDWINE, R.A.

"SEMPER PARATUS."

DUNCAN GOLD MEDAL PRIZE ESSAY, 1897.

ARRANGEMENT OF THE SUBJECT.

I. Introduction.

II. The Requirements of Warfare:—
The Conditions of Attack.
The Conditions of Defence.
Recapitulation and Deductions.

III. Methods of Practice advocated:—
Quick-firing Guns.
High-angle fire Guns.
Direct fire Guns.
Classification of Practice.

IV. Conclusion.

I. INTRODUCTION.

THERE can be little doubt that the subject of this essay has been opportunely chosen. During the last few years great changes have taken place in the conduct of Coast Artillery practice, and methods have been arrived at which, though necessarily far from perfect, have been of infinite advantage in creating in officers and men a greater knowledge of and interest in their work, and in fostering a spirit of emulation among companies. It seems, however, to be generally felt that the time has arrived when still more definite improvements may be considered. There are great difficulties in the way of changes which may affect a large number of units and individuals serving under the very varied conditions which obtain in this branch of the regiment. The endeavour will therefore be made in this paper to suggest such improvements only as may be generally applicable to all cases, details being omitted unless of wide application.

The heading of the subject enforces in the first place the consideration of the question "What are the requirements of actual warfare?" And this entails some enquiry into the circumstances attending war, so far as they concern Coast Artillery. This enquiry unfortunately is connected with matters of rather wide scope, on which very diverse views are held. The truth of the following passages is exemplified almost daily:—

* "Coast Defence may be treated from many points of view . . . yet the great principles of warfare by sea and land remain unchanged and unchangeable. . . . Fixed data, unquestioned deductions from real experience, are generally unattainable and the human mind, craving certitude, readily invests its individual promptings with the sanction of authority. . . Principles are thus effectually obscured, and matters of secondary importance become the first objects of discussion, while policy drifts or is allowed to be dragged in the train of mere subordinate detail. . . Coast Defence appears to be peculiarly liable to danger of this nature. . . Standing on the border where sea and land meet it has a dual aspect—naval and military—by which a confusion of ideas is apt to be engendered. Moreover the war record of Coast Defences has been little studied, and is intimately bound up with those great lessons of naval history which are only now beginning to be rightly understood."

Too broad a view therefore cannot be taken. But space will not admit of a full treatment of the question, so that it will be necessary to quote and apply the conclusions of those who are generally regarded as authorities, or whose views have received authoritative sanction. Reference is invited to their writings for the full arguments by which these conclusions are supported.

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* "Coast Defence in relation to War," Major Sir G. S. Clarke, K.C.M.G., R.E. "Proceedings of R.A. Institution," Vol. xxi., No. 11.

II. THE REQUIREMENTS OF WARFARE.

THE CONDITIONS OF ATTACK.

The natures of attack to which coast defences are liable are broadly divisible into the following classes :—

(a) Deliberate Attack.
(b) Bombardment.
(c) Forcing a Passage.
(d) Raid.

Blockade is not an attack in the tactical sense. A merely blockading enemy would not afford Coast Artillery the opportunity for firing a single round.

(a) By Deliberate Attack is meant such attack as has for its ultimate object the capture of the fortress. This would only be attempted for the purpose of territorial occupation. In the great majority of cases the object could best be gained by the action of military forces landed outside the sphere of coast defences. The Deliberate Attack by purely naval forces holds out no hope of success to the assailant. History is full of instances of its failure, while such successes as can be claimed for it have been obtained under exceptional circumstances of a sort not likely to be present in conflicts in which our coast defences are engaged. Neither by sea nor land could it be attempted unless the attacking power held command of the sea. That it is unlikely that this will be allowed to occur may be inferred from a confidential memorandum with regard to Imperial defence quoted by the Duke of Devonshire in the House of Lords (11th February, 1897) :—

"The maintenance of sea supremacy has been adopted as the basis of the system of Imperial defence against attack from over the seas. This is the determining factor in shaping the whole defensive policy of the Empire, and is fully recognized by the Admiralty."

It has been said by an officer of large experience that :—

* "Attacks on an enemy's fortified ports across the sea are generally undertaken for naval objects, are practicable only on condition of full naval superiority, and to be effective must assume the form of military operations on shore, supported by a covering naval force to maintain communications."

With the land phase of Deliberate Attack we are not concerned. But if land attack is undertaken in conjunction with naval attack it exercises a limiting influence on the latter, since owing to difficulties of transport and supply the sphere of attack is much narrowed. As complete command of the sea is a necessity for the naval attack, whether in concert with land attack or apart from it, such an operation could not be undertaken until some considerable time after the commencement of hostilities. Taking into account all the disabilities under which ships labour when engaged with fortifications it is evident that, unless the latter are very weak and disorganized, a strong fleet, heavily armed, and perhaps including specially constructed vessels for bombardment, is a necessity to the assailant. The conflict would be one of

* "Coast Defence in relation to War," by Major Sir G. S. Clarke, K.C.M.G., R.E. "Proceedings of R.A. Institution," Vol. xxi., No. 11.

many phases, and probably include some of the measures of offence referred to under the remaining headings. If mines existed they would have to be cleared away by countermining, the conditions of which are almost identical with Raid.

(b) Bombardment may be either Persistent or Desultory. Persistent Bombardment could occur only under such conditions of sea power as admit of and with such objects as call for Deliberate Attack, of which it would probably form a part. It need not therefore be considered separately.

Desultory Bombardment of the port or shipping guarded by the defences, for the sake of destruction or moral effect, is perhaps barely possible at any time from the commencement to the close of hostilities, and in any state of sea power; but the advantages to be gained, where defences are moderately well equipped, appear so very doubtful that its use is highly improbable. In order to produce appreciable effect the ships must anchor. Guns of large calibre, admitting of long ranges and heavy bursting charges, would be required, and an immense expenditure of ammunition would be necessary. Ships carry comparatively few rounds for their heavy guns, and will not risk engagement with hostile vessels when short of ammunition. Neither are they normally provided with the means of employing high-angle fire, by the use of which alone full effect can be given to bombardment.

* "It may be safely asserted that no serious bombardment of properly grouped, gunned and garrisoned forts is possible without especially constructed vessels and much preparation. . . . Such a preparation involves complete command at sea. Without this condition the attack is limited in its nature by (1) time; (2) coal; (3) ammunition; and is only likely to be undertaken by a small squadron."

(c) Forcing a Passage—that is with a view to operations in interior waters not commanded by coast defences. This is possible in any state of sea power except where the defenders hold complete command. Where open waters do not exist inside the defences such an operation could only be attempted under the same conditions as are required for Deliberate Attack.

The American Civil War afforded many examples of forcing a passage, but their lessons are of little value to us in this connection from the fact that interior waters of any extent are of very infrequent occurrence in the British Empire. Port Phillip alone appears to offer any inducement for such tactics.

Where the attempt is made—if vessels of any size are to pass—it will be by day, possibly immediately after a night reconnoissance by small craft which, if the passage is mined or obstructed, may be sent in to clear it. The ships will steam past at their highest speed and endeavour to avoid all conflict with the forts, probably only using their lighter guns, quick-firing and machine, to pour in as rapid a fire as possible, with a view to causing losses to personnel which may impede

* Silver Medal Essay, 1893, Major R. F. Johnson, R.A., who quotes in this connection Naval Prize Essay, 1892, Journal of R.U.S. Institution, Vol. xxxvi.; and "Attack on Lissa," Lewis. R.E. Occasional Papers, Vol. ix.

the service of the shore guns.*

(d) Raid—that is a sudden attempt to penetrate the defences with a view to the destruction of shipping in the harbour or under construction, docks, coal and stores.

Not only can this form of attack be adopted by either side in any state of sea power, but requiring no preparation on the part of the assailant it is to be confidently expected, at ports within range of the enemy's base, not later than immediately after the outbreak of hostilities, and possibly even before they have formally commenced. † Prompt action of this nature holds out the best hopes of success, since the defender on the other hand is less likely to have completed all those arrangements, such as the placing of obstructions, for resisting attack, which cannot be finally effected in time of peace.

The larger torpedo boats are unquestionably the most suitable craft for such undertakings. They are very speedy and can therefore reach their objective in a very short time after leaving the base,‡ and can more easily elude detection and attack, both en route and on attaining their destination. By reason of their light draught they are not confined to the ordinary channels on approaching a port. Their small size and particularly their low freeboard, further aid them in eluding observation, and render them a difficult target. Above all they are comparatively cheap, carry small crews, and can be very quickly built, while at the same time the damage they are capable of inflicting is out of all proportion to the inconvenience which the loss of even several of them might occasion.‡ Night or thick weather, or both, offer the best facilities for the attack, during which every endeavour will be made to escape detection by the defence.

It is conceivable that Raid might take the form of landing small parties with a view to destruction on shore, but if this is done outside the range of the sea defences it must be met by the military precautions usual on land, while if landing takes place inside this area opposition to it would assume precisely the same form as that to torpedo-boat attack. There seems no probability whatever that large vessels will ever be used for purposes of raid where the defence is not utterly disorganized. They can effect no destruction which cannot be equally well carried out, with the help of modern explosives, by smaller craft, while every advantage which the torpedo boat possesses would be sacrificed by their use. There is however this exception: where the attacker has reason to believe that the channel is obstructed to such an extent that the boats will have physical difficulties in effecting an entrance, it is not unlikely that under favourable circumstances an old or specially constructed vessel of larger size may be sent in with them for the purpose of making a breach in the obstructions, sacrificing herself if necessary.‡

* In corroboration of the above reference is invited to "Naval Attack of Fortifications," Capt. May, R.N., R.A.I.P., Vol. xix., No. 3; "Ships versus Forts," Capt. Jackson, R.N., "R.E. Occasional Papers," 1889, p. 217; "Floating Defence," Lieut.-Col. Sir G. Clarke, R.E., R.A.I.P., Vol. xxi., No. 10; "The Attack of a Coast Fortress," Major R. F. Johnson, R.A., R.A.I.P., Vol. xx., No. 7; "The Training together in Peace Time of the Garrison Artillery Forces of the Empire," Captain Nicolls, R.A., R.A.I.P., Vol. xxii., No. 7.

† "The Attack of a Coast Fortress," Major Elmslie, R.A., Prize Essay 1893, R.A. Institution Proceedings, Vol. xx., No. 7.

‡ "The value of torpedo boats in war time," Comdr. R. H. Bacon, R.N., "Brassey's Naval Annual," 1896.

The nearer a port to the enemy's bases the more liable it obviously is to this form of attack. But no ports, however distant, can be considered free from it, for if out of range of sea-going boats they are still open to attack from smaller types carried by battle-ships and cruisers. Indeed the very fact of their situation at a distance from home may be a source of danger. Submarine cables may be cut at sea before war is declared, and, without intelligence of current events, the first intimation of hostilities may be derived from an experience of this nature.

It has been stated above that Raid is to be expected in any condition of sea power. This is obviously the case when command of the sea is indifferent, or doubtful, or in the hands of the enemy; and until the advent of the torpedo-boat destroyer no argument was required as to the possibility of its use even by an enemy blockaded in his own ports, since the immense difficulty of making blockade so effective as to hem in torpedo boats with certainty was universally acknowledged. But as one of the chief functions of the destroyer is to assist in blockade with especial reference to torpedo boats, it may be well to enquire how far the question has been modified by their adoption during the last three years. Some help is to be obtained from a study of the manœuvres of the torpedo squadron under Rear-Admiral Wilson, v.c., in 1895, one of the objects of which was to test the capabilities of destroyers in this respect. The manœuvres were confidential, and no definite conclusions appear to have been published. Accounts are somewhat contradictory in detail but it is recorded that in an instance where ten torpedo boats with two gun boats were blockaded in two ports, Wicklow and Howth, by twelve destroyers and two cruisers:—

"The boats at Howth experienced no great difficulty, owing to the darkness, in evading the blockaders, and joining the Curlew at a prearranged rendezvous they effected an entrance into Wicklow." *

Here they remained safe for about thirty-six hours. On the following night:—

"Being again dark and the weather fine the boats endeavoured to leave their ports. Five of them were put out of action in the attempt, and others were also claimed by the destroyers on less conclusive evidence. No. 94 escaped by a ruse, disguising herself as a destroyer by fitting up an additional funnel." *

"The net result seems to have been that in spite of the blockading squadrons of torpedo-boat catchers (sic), the bulk of the torpedo boats appear to have found no difficulty in eluding them, and breaking out of the blockaded harbours." †

So far as can be traced no manœuvres have taken place since 1895 the published accounts of which throw any further light on this question. The following remarks however bear on the subject.

"The object in view, that originally led to the construction of these destroyers, was the annihilation of the smaller patterns of torpedo boats, but it is impossible to doubt that in addition to such work a portion of them must be used as torpedo boats." ‡

* "British Naval Manœuvres," Charles Greig, late R.N., Brassey's Naval Annual, 1896.
† "Naval and Military Notes," Journal of the R.U.S. Institution, Vol. xxxix. No. 211.
‡ "The Value of Torpedo Boats in War Time."

The lesson to be learnt seems to be that although destroyers may perhaps help to limit the ravages of the enemy's torpedo-boats, once our command of the sea is established, yet previous to that state of affairs, and especially in the very early stages of a war, not only can little if any diminution of such attacks be expected, but there is added to their possibilities the use of the destroyer herself, which will compete on equal terms with the destroyers of the defending fleet in all states of sea power, and whose use shortens considerably the time taken in passing from base to objective, thus making the stroke more sudden, and also, on account of their increased power of keeping the sea and greater coal endurance, largely extending the range of it. It is true that other nations have at present very few of these craft, but as they can be rapidly built this fact does not to a great extent lessen the probability of their employment, at all events in the later stages of a war, at which time their value will be most felt by a blockaded enemy.

It appears then that, as matters stand at present, the menace to our defended ports of torpedo-boat attack is as great at the commencement of war as it ever was, perhaps lessening somewhat as command of the sea is secured, but never disappearing; and that in the event of our opponent constructing destroyers during war, these will again increase the chances of Raid after a certain lapse of time, by enabling the blockaded fleet to oppose to the blockaders boats of equal power to their own.

THE CONDITIONS OF DEFENCE.

The means of defence consist of men and material.

Taking material first, it is composed of the following:—

In charge of and controlled by the Artillery—the guns.

In charge of the Engineers but directed by the Artillery—electric lights, when used as search lights (if any).

In charge of and controlled by the Engineers—electric lights used as fixed beams, submarine mines, and Brennan torpedo.

In charge of the Navy—Passive obstructions by sea of a temporary nature.

Besides which there may be obstructions of a permanent nature, such as breakwaters.

The subject of this essay, however, applies to the guns alone, except in so far as the influence of the other agents of defence is so intimately associated with theirs as to necessitate joint consideration. In this connection the following passage is noticeable:—

"The breakwater is the only unanswerable argument to a torpedo-boat. Behind it ships are practically secure against boat attack. The only vulnerable point is the entrance or gateway, which is capable of such concentration of defence by gun-fire, booms, and boat-mines, as to make entrance by unsupported boats practically impossible." *

The guns may be conveniently divided into three classes, each having a more or less special application and a somewhat distinct method of fire-control and direction. They are Quick-firing Guns, High Angle Fire Guns, and Direct Fire Guns.

* "The Value of Torpedo Boats in War Time." 43

The first two classes need no definition. The third heading is used, for want of a better term, to include all guns not comprised under the first two.

Quick-firing Guns of the lighter natures are provided primarily for dealing with very quick unarmoured targets, such as torpedo boats, but their use against the unarmoured parts of ships at short or medium ranges is also likely to prove very effective. If countermining is attempted they must interfere to prevent it. When mounted for defence against torpedo-boat attack the normal group consists of not less than two guns. The heavier quick-firing guns are best adapted to the attack of unarmoured parts of larger vessels.

High Angle Fire Guns are especially intended for preventing, by deck attack, bombardment from ranges at which the ships' side armour overmatches the defender's direct fire guns. They are not intended or likely to be called upon to deal with vessels moving otherwise than very slowly. They are disposed in "batteries" of two or more guns, usually in concealed positions.

The Direct Fire Guns are intended to encounter ships, armoured or unarmoured, whether anchored or under way, at all ranges within their effective area. Their disposal and grouping vary very considerably. Some are, or are to be, furnished with special case shot for use against torpedo-boats where channels are narrow and quick-firing guns not available. The lighter natures belonging to the armament for general defence are chiefly applicable to the defence of land fronts, or the resistance of attempts at landing, but might also be used as auxiliary to the primary armament. No definite system of fire discipline is laid down for these. Machine guns however are likely to be found mounted in conjunction with quick-firing guns,* and would then presumably conform to the fire tactics of the latter.

The men for manning the above defences consist of the following:—

For the guns—the Royal Artillery (whose numbers would be increased in war from the Reserve), together, at home with the Militia and Volunteer Artillery, and at some stations abroad with local artillery, and occasionally infantry.

For the other defences—the Royal Engineers; with the exception of the temporary obstructions, which are managed by the Royal Navy.

RECAPITULATION AND DEDUCTIONS.

The elements of attack and defence, together with the circumstances attending their use, may now be considered collectively, and from these certain general requirements may be deduced as being those of actual warfare. The endeavour has been made in the foregoing paragraphs to submit as briefly as possible the fundamental considerations on which an enquiry into the best methods of conducting practice in accordance with the requirements of war must be based. But at the same time, in order to fully support the proposals which it is desired to advance, it has been necessary to carefully guard against any lack of clearness or completeness in the premises (which have not always

* Amendments 1896, to G. A. Drill, Vol. i., 1895, "Service of Quick-Firing Guns for defence against Torpedo Boats."

received due acknowledgment) so that further abbreviation appeared inadvisable.

The table on the next page, which embodies in a short form the views and facts already put forward, will probably help to make clearer the general conclusions arrived at.

These conclusions are as follows :—

(1.) One form of attack—raid—stands out prominently from the rest as being under all circumstances most probable—even most certain. The best means of meeting it, viz., with the lighter quick-firing guns assisted by obstructions, and at night electric light, is equally clear. It is therefore obvious that before and above all the most pressing demand made by the requirements of war on the conduct of Coast Artillery practice is for the provision of adequate opportunities of practically training all ranks in the use of these weapons.

(2.) With regard to the other possible forms of attack we find on examination that each is subject to qualifying conditions, relating to maritime power, expediency, or opportunity, which renders its employment by our opponents improbable. The means of defence corresponding to such attacks become therefore of relatively minor importance. But it does not follow that the necessity for them disappears; the following extracts clearly indicate their scope and uses :—

"Between permanent loss of the command of the sea, and the possibility of a temporary reverse which might expose some portion of our coasts to the risk of invasion, there is a very wide difference. As far as I know no government has ever contemplated—certainly this government has not—the neglect of any precaution which might tend to the diminution of such risks." *

"Our coaling stations should be able to stand alone against any attack which is likely to be directed against them during the temporary absence of the fleet." †

"Coast Defence in the narrow sense demands merely that purely naval attack shall be rendered hazardous. If this condition . . . is not fulfilled, results important, though restricted, can be attained by purely naval action." ‡

III. METHODS OF PRACTICE ADVOCATED.

QUICK-FIRING GUNS.

12 pr., 6 pr. and 3 pr. Q.F.—To obtain service conditions the most important requirements of practice from the lighter quick-firing guns are that :—

1. It should take place from a group or groups, each consisting of not less than two guns.
2. It should be carried out principally by night.
3. It should be possible to run two or more targets at the same time.
4. The targets should be capable of a speed of not less than 20 knots.

* Speech of the Duke of Devonshire in the House of Lords, 11th February, 1897.
† Speech of the Marquis of Lansdowne in the House of Lords, 4th February, 1897.
‡ "Coast defence in relation to War."

TABLE.

Nature of Attack.	Probable Object.	State of Sea Power.	Class of Vessels likely to be used.	Probable Time.	Means of Defence applicable.	General Remarks.
(a) Deliberate Attack.	Ultimate occupation of territory.	Command necessary to the attacker.	All existing classes. Perhaps specially-constructed vessels.	Day, but may be continued by night.	All guns which can bear (mines and Brennan torpedo, perhaps obstructions).	Includes Persistent Bombardment. "Means of Defence" refers to naval attack only. Purely naval attack unlikely except against very inefficient defences. If in conjunction with land attack objective must be fairly close to enemy's base. Cannot occur at beginning of hostilities.
(b) Bombardment.	Destruction, or to produce moral effect.	Barely possible in any state.	Battleships, cruisers, and gunboats.	Day or night.	High-angle fire guns, heavy direct fire guns.	Refers to Desultory Bombardment only. An unlikely form of attack by our adversaries.
(c) Forcing a Passage.	To operate in interior waters.	Possible in any state except when defender holds command.	Any vessels, but probably fast ones.	Day.	Direct fire and Q.F. guns (mines, Brennan torpedo and obstructions).	Applicable to very few of our coast defences.
(d) Raid.	Damage to shipping, docks and stores.	Probable in any state, particularly when indifferent or doubtful.	Torpedo-boats and torpedo-boat destroyers, perhaps accompanied by a larger vessel for breaking through obstructions.	Night. In thick weather by day or night.	Quick-firing guns, machine guns, and heavy guns firing special case (obstructions and boat mines).	Applicable to all defended ports in proportion to their importance and nearness to enemy's bases. May occur before, almost certain immediately after, declaration of war.

"Means of Defence" placed in brackets are not under Artillery control.

5. The time of starting the targets should be unknown to the group beforehand.

6. At night practice the targets should be out of view until they are started.

7. The targets should have as far as possible the appearance, and some approach to the dimensions (in freeboard at all events), of an actual torpedo-boat.

8. The range should be a clear one, so that interruptions which would not occur in war may be avoided.*

These requirements may appear at first sight formidable, and difficult of attainment. It is hoped, however, to show that the difficulties are not so great as they seem.

Taking into account the very early period of the war at which, as we have seen, quick-firing guns will be called into play, there can be no doubt that they can be efficiently manned only by permanent artillery, either Royal or local. Militia and Volunteers will probably be scarcely mobilized when the first raid takes place, much less will they be capable of making the best use of weapons requiring on the part of their commander so much smartness, readiness and self-reliance, and of the detachments such skill and alacrity. These qualities spring from a man's intimate acquaintance with his comrades, and familiarity with his weapon and his own power of using it. They can only be acquired and maintained by careful and continuous instruction, drill, and *practice* together of all ranks, both by day and night, opportunities for which are necessarily lacking to the auxiliary artillery. So far as these guns are concerned therefore we need consider the practice of the regular artillery only. It is necessary to insist on this point, as the suggestion has been made that these guns at home should be allotted on mobilization to the Volunteers.† This would greatly increase the obstacles to carrying out practice under service conditions.

The first and perhaps the greatest difficulty occurs in connection with night practice, a requirement of the most urgent importance. This would be experienced in the highest degree at precisely those stations—large harbours and naval ports—where quick-firing guns are of the greatest value in defence. On the other hand, the extremely few places where night practice might be found possible would probably be in very shallow and unfrequented waters, devoid of all the peculiar features of sea and land belonging to ports and harbours, and little likely to be approached by actual torpedo-boats. Practice if confined to such localities would unavoidably tend to degenerate into mere shooting at a target. The benefits to be gained by local knowledge of channels and familiarity with the appearance of torpedo boats in motion, by day and night, would be in danger of being lost sight of.

It is therefore proposed that practice should be divided into two distinct portions, as follows :—

(a) Blank practice, to be carried out at actual torpedo-boats, and from the guns which would be manned in time of war, at each station where quick-firing guns are provided.

* "Report of School of Gunnery," 1896, Part 1, paragraph 25 (e).

† Proceedings of R.A. Institution, Vol. xxii., No. 7., p. 356.

(b) Shell practice, to be carried out at some place affording opportunities for day and night practice at quick targets over a clear range.

(a) The object of this practice would be to accustom officers and men to dealing with actual torpedo boats; to prepare them for the tactics which raiding boats are likely to employ; to exercise them in picking up and laying on boats by night under service conditions; and to teach them the influence exerted by the local conditions of their particular port. The co-operation of the naval authorities is a necessity for this form of practice. There has hitherto been considerable difficulty in securing such co-operation, but a juster appreciation by each service of the other's wants and duties is beginning to be felt. Artillerymen no longer regard their guns as the main factor in resisting invasion, while most naval officers are prepared to acknowledge the usefulness of coast defences as a protection from raid. There are indications that joint operations of the kind proposed would not meet with much opposition from the Navy. They have been strongly recommended by Lord Charles Beresford in a recent magazine article* as likely to be of benefit to both services. There are probably few, if any, stations at home or abroad provided, or to be provided, with quick-firing guns where they could not take place at some period of the year. Indeed it is believed that a scheme of this nature is at the present time receiving consideration, and may be definitely settled before this essay is read. In one station at least manœuvres of a similar kind have already been carried out by private arrangement.

It is almost superfluous to add that electric lights must be available, and such obstructions as would be used in war either placed in position or assumed to exist.

(b) The above operations however would be of little value without the addition of actual shooting.

The "Instructions for Practice Seawards, 1897," contain a notable innovation, viz., a scale for the issue of torpedo-boat targets to various stations. The ultimate adoption of these targets can therefore be accepted as a certainty, and this goes far towards simplifying the suggestions which it is intended to offer with regard to shell practice. It is assumed that the means of running them will be similar to that which has been for some time in use successfully at Shoeburyness, viz., a winding engine on shore and a wire cable, led over bollards. Also that the speed will not be less than twenty knots.

There are however objections, which it is submitted are well grounded, to the proposed distribution of these targets at home. Some of the stations to which they are allotted are notorious for the foulness of their ranges, and none it is believed afford any facilities for night practice. It will surely be acknowledged that if this is the case, and if blank practice can take place as suggested under (a), it will be better, instead of attempting to carry out shell practice under artificial conditions at these stations, to send details from thence to one specially selected place, where obstacles of the kind referred to are not present. Such a place would thus become the practice camp for quick-firing artillery, and in selecting it accessibility should be kept in view. The

* "Urgent Questions for the Council of Defence," Nineteenth Century, February, 1897

saving effected by unification of plant and decreased cost of maintenance would probably help materially to lessen the cost incurred for transport, without reckoning the gain in efficiency.

Discussion as to the suitability of any particular place for the purpose suggested hardly comes within the scope of this essay. It may be noted however as a proof that the suggestion is practicable, that failing other more suitable places the desired facilities exist at Shoeburyness,* where the power is given of closing the foreshore entirely at low water, and to all but trading vessels at high water. Targets for night practice would probably have to be run, as at present, on wheels over the sands, but this, supposing the dimensions and appearance of the targets to be suitable, need detract but little from the value of the practice.

The requirements not already dealt with, viz., 1, 3, 5 and 6, present no difficulties. The reasons for them are obvious when we consider the nature of the target likely to be offered in war, viz., several boats appearing at high speed, successively or in a swarm,† and without the least warning, in the narrow area illuminated immediately in front of the obstructions. The difficulties attending fire direction in such a case can hardly be over-estimated. Without previous experience of similar conditions failure must ensue.

In addition to the eight most important requirements which have been already mentioned, the following points deserve notice :—

At least two groups should be available for simultaneous practice. Where a port is liable to attack on the scale instanced above some previous understanding between groups as to the selection of target would appear to be a necessity. This procedure should be rehearsed at practice.

The scale of ammunition should be ample. It does not follow however that much, if any, extra expense need be incurred on this score. The regimental practice funds are available for drawing on, and a very slight revision of the scale of issue for heavy guns might yield a considerable increase.

Illuminated sights should be provided for night practice.

The target should be capable of recording hits.

The arrangements made for winding in the target should admit of the direction of its travel being varied. This only entails the provision of suitable bollards.

The engine employed should be so constructed or placed as to give no warning by noise of the starting of the target.

Electric lights should be provided on the scale likely to exist at important harbours in time of war.

The position of supposed obstructions should be indicated by marks or buoys.

It is taken for granted that cordite would be employed. The term "quick-firing" applied to guns firing black powder is a misnomer.

If the above recommendations were carried out almost infinite variation of the tactical conditions would be possible, with a view to illustrating the requirements of different stations.

* Bye-laws, Shoeburyness Ranges, 1895. Report of School of Gunnery, 1896, Part I, paragraph 22.

† Page 11 "Amendments 1896, to G.A.D.," Vol. i., 1895.

It should be borne in mind that the service conditions under which these guns will be used on land are different from those that obtain on board ship. Confusion of ideas on this matter has sometimes occurred. Each ship must protect herself, and consequently her guns are devoted in the first place only to such boats as are attacking her in particular. These must come to fairly close range in order to have a good chance of disabling her, and the nearest boat at any time is that to be most feared, and on which all fire must be concentrated. The case is different with shore guns. Those boats which have the best chance of getting past are the most dangerous, and these may be the most distant from the guns, which they will endeavour to avoid instead of approaching. Selection and indication of target by the gun group commander become therefore matters of the most vital importance.

Shell practice has so far been treated of with especial reference to home requirements, which appear capable of satisfactory fulfilment. Abroad the difficulty is greater. It is doubtful whether such facilities as are desirable can ever be afforded without going to the expense of providing special practice batteries at every station. The establishment of a regular Q.F. practice camp at home, which could be kept at work throughout the year, would however be of great value, and officers and men who had attended it would gradually permeate the Garrison Artillery. Besides it seems reasonable to suppose that a few gun group commanders and gun captains might be sent home at intervals to profit by its advantages. A similar course has been pursued in the training of other experts—master tailors for example, whose vocation is hardly of equal importance.

It is not intended to suggest that even at home whole companies should attend the camp. The attendance of a certain number of officers and men should be authorised for each station, the number depending on its importance and armament. The selection of these should be left to the officer commanding. In the first place those details should be sent on whom would fall the duty of manning the guns in war, and the practice carried out by these should be most thorough. After making provision for them it would be advisable if possible to secure the attendance of a reasonable number of other officers and men, each company at home sending a due proportion, say once in two or three years. The numbers to be accommodated in the course of a year would be a matter for consideration and arrangement, but the whole quick-firing manning details from any one station should be sent, as far as possible, intact and together. It is believed that the benefit accruing to the Garrison Artillery from the adoption of some such scheme as has been outlined would be incalculable, and to the subaltern of that branch in particular, in whom at last would arise the hope of undivided responsibility and independent command.*

There remains to be mentioned practice with aiming rifles and tubes. These are especially important adjuncts to quick-firing guns, in the service of which individual skill in fire direction and laying has

* See Report of School of Gunnery, 1896, Part 1, paragraph 188.

such an extensive influence. The strong appreciation of their advantages expressed in the last report of the School of Gunnery* encourages the belief that their approval for land service will not long be delayed. The Navy has had them for years.

Practice with aiming rifles (·45 inch calibre) at a small target moving over the actual fire area of the guns should be carried out by the proper detachments once a week. Ranges up to and not greater than about 500 yards will probably be found most suitable, as the arc passed through by the target in a given time will then be a fairly large one, and if the size of the target is proportionately decreased the difficulties of ranging and laying on a quick target of ordinary size at longer ranges will be illustrated with some approach to truthfulness. Such a target, about four feet by one foot six inches, if properly made, can be towed at a sufficient speed by a rowing boat of the kind generally held in artillery charge at coast stations.

The aiming tubes (·23 inch calibre) should be used in connection with a miniature range giving facilities for running a small moving target. Part of the path of the target could be lit up at night by a suitable oil lamp with bulls' eye lense, in imitation of the electric light, and the target, of a size proportionate to the length of the range, being passed across the lighted belt, a fair resemblance to the service conditions of vision would be obtained. A range of this description is in use at the Royal Naval School of Gunnery at Whale Island. The best length for the range is about twenty-five yards. With this length the target should be a broadside model of a torpedo boat, on a scale of about $\frac{1}{60}$th. It would then appear of the same size, when viewed from the gun, as would the real boat at a range of 1,500 yards. The range should be accessible to all N.C. officers and men during their spare time. They would probably need little encouragement to use it, but the offer of small prizes periodically, which could be obtained from company or regimental funds, would perhaps further conduce to the bringing forward of the best layers, who would be available as understudies to the proper gun captains, and to replace waste among these due to transfers, discharges, etc. Any brick wall of average height forms an efficient butt; both traverse and elevation may be limited mechanically so that no shot can miss it. The gun used might be one of those belonging to the armament, a 6 pr. for choice on a light temporary cone or pivot. It would be better however to use an unserviceable gun or a dummy, properly weighted and balanced, and similarly mounted. The armament guns need not then be interfered with. The expense of such a range should be very small.

If automatic sights are ultimately introduced for quick-firing guns, the effect will be to take fire direction to some extent out of the hands of the gun group commander. Their application to groups of guns is yet untried, and the advantages of it are perhaps open to question. If adopted however their use alters none of the principles which govern the conduct of practice, though details may require slight modification.

* Report of School of Gunnery, Part 1, paragraphs 20, 21, 188.

6 inch and 4·7 inch Q.F.—These guns, not being intended for use against torpedo-boat attack, are unlikely to be wanted at night (see table). Should however a larger vessel be employed to clear a passage for torpedo boats through temporary obstacles, if conveniently sited their effect would be useful. But a vessel risked for this purpose would almost certainly be old and therefore slow, and an easy target on this account and by reason of her size. Practice from them does not call for the special measures necessitated by the circumstances attending the use of the lighter guns. Their special province is the attack of the unarmoured parts of larger vessels by day. Some of these might be fast ships, so the quickest targets obtainable should be used.

No special scheme of fire discipline is laid down for these guns, but it is assumed that, for the sake of rapidity of fire, that authorized for the smaller natures will be followed. Practice from aiming rifles and tubes should therefore be carried out on the same lines as for the other quick-firing guns, in addition to the ordinary practice, with a view to instruction in ranging and laying. Aiming rifles and tubes for the 4·7 inch are approved.

HIGH-ANGLE FIRE GUNS.

To obtain service conditions for practice from these is not very difficult. Their targets in action would be vessels at anchor or moving slowly. Rapidity of fire is not so important as accuracy, and this they are able to attain by the help of the position-finder. The chief object of practice is therefore to train the battery commander in fire direction and P.F. operators in observation of fire.

The targets used for practice should be both anchored and drifting. No special form of target is authorized, and those generally used do not record hits or admit of their being readily estimated by the range party. It is useless to trust to the position-finding operators for this; their estimate of error in range is inclined to be optimistic. A real record target would be an impossibility in any but the calmest weather, and unwieldy at the best of times; but a fair approach to one could be obtained by lashing loosely together four light spars of convenient length in the form of a rectangle, bracing them loosely with similar spars diagonally and attaching a float carrying a bannerole to each corner. This would stand any ordinary weather, and a range party, suitably placed on a flank, would be able to judge of the effect of fire with regard to range, while observation for line could be carried out from a position in the line of fire. From the joint observation of these two parties hits could be detected.

As the power of indicating target by the fire commander to the battery commander would be a matter of some importance, this should be practised, two or three targets being put out for the purpose and fire turned from one to another.

There seems little necessity for night practice, except with blank ammunition to test apparatus. Ships certainly might carry on bombardment by night, but could only do so with the slightest hope of effect when they had commenced it by day, and obtained bearings on

which to continue it. In this case their positions could be plotted on the chart of the position-finder, and fire maintained with the same ease as by day.

High angle fire guns do not suffer from foul ranges in the same degree as direct fire guns (reference to which will be made presently), owing to the sites in which they are usually placed, their long ranges, and the absence of ricochet. There is also less necessity for quick continuous fire from them. No aiming rifle has yet been introduced for them, but such an apparatus, on similar lines to the Italian "tube-cannon" of 2·78 inches calibre, would be of advantage if of suitable design and firing cheap ammunition with a variable powder charge.

DIRECT FIRE GUNS.

These are of so many different natures, so variously mounted, sited, and grouped, that practice from them can be only very generally dealt with. There are however certain principles which are of universal application, or nearly so. Local arrangements should be based on these.

The heavier guns are primarily intended to resist deliberate attack, but their use in the case of desultory bombardment or forcing a passage must be contemplated. In many places they form the sole means of defence against bombardment. It has been shown however that each of these latter forms of attack is unlikely for different reasons, and that deliberate attack could not take place in the early stages of a war, or even afterwards unless command of the sea was lost to the defenders. It is therefore in assisting to man these guns, at which the details will probably have plenty of time after mobilization to settle down and become accustomed to their duties, that auxiliary artillery can be of the greatest service. But in order that there may be no unpreparedness for emergencies, a few of the most powerful guns, at any place which is liable to bombardment at the beginning of a war, should be manned by regular artillerymen. This is especially desirable if no high-angle fire guns are mounted. If well served they would be quite sufficient to deter an enemy not thoroughly prepared for this form of attack, which at such an early stage is impossible, from prosecuting it with any vigour. Similar precautions are necessary in the case of defences liable to the third form of attack, but in this case the guns capable of the most rapid service would be those most wanted. It seems therefore that both the regular and auxiliary artillery should train and consequently practice with these guns, the former in addition to all other guns, the latter exclusively.

That curse of Coast Artillery practice, foul ranges, is more felt with these guns than with any others, on account of their large danger zones, due to possible ricochets. No other service, when practising the use of its own weapons, suffers in a similar way. It is as though a battalion of infantry at field firing were compelled to await pauses in the traffic of a thoroughfare which the military authorities were powerless to close. No practice can possibly be

carried out "with a view to the requirements of actual warfare" until such conditions are abolished.*

There are two possible solutions of the difficulty, viz., practice batteries in unfrequented waters, and bye-laws under the Artillery Ranges Act. A judicious combination of the two might effect great improvements.

Practice batteries should be constructed at as many stations as possible, and should be in waters fairly clear of shipping, which are generally to be found adjacent to a fortress, but for obvious reasons do not exist in front of its defences. They should be armed with from two to four guns of modern type, arranged so as to be capable of working as two groups under a battery commander. The most suitable gun appears to be the 5-inch B.L., of which it is believed a large number on Vavasseur mountings are lying idle in the hands of the Admiralty. The ammunition is cheap, consequently a comparatively large number of rounds would be available. Even should the scale be reduced, ten rounds fired under such an approach to service conditions of continuity as would then be possible are worth twice that number expended in driblets, as is too often the case now. The batteries should be available for use by Militia during their training, and by Volunteers at all times. By their help a true understanding of what "fire discipline" implies could be instilled into the minds of all branches and all ranks of the Coast Artillery.

But it would not do to rely on such practice alone. At all stations if possible, in any case at all important fortresses, power should be granted to close the ranges during certain restricted periods; for example, for any four days during the months of August and September, and for not more than four hours in any one day—the time of year being of course chosen so as to interfere least with the special pursuits of the particular locality, and if possible to coincide with the training of the Militia and the annual camp or practice of the Volunteers allotted to the defences, who should undoubtedly be present. All works should be manned simultaneously, and as completely as the numbers available allow. The greatest difficulty in carrying out service practice (in its true sense) would thus be removed. Even if such facilities for practice were afforded once only in several years a great stride would have been made towards efficiency. These remarks apply equally to practice from the heavier quick-firing guns, which together with high-angle fire guns should be included in the combined practice. During the practice the troops should be quartered, allotted to guns, supplied, and equipped as they would be in war. In drawing up schemes for practice, determining courses of targets, etc., the tactical conditions of the particular locality and the natures of attack to which it is most liable should be kept in view. Such practice alone can thoroughly test the fighting organization of the defences, the communications, etc., or give the fire commanders proper opportunities of rehearsing their duties. It is more than possible that some of those refinements of detail which have rather tended to increase and multiply in the artificial atmosphere produced by present conditions would disappear under its healthy influence.

* See Report of School of Gunnery, 1896, Part 1, paragraph 25 (e).

Where Forcing a Passage is a possible form of attack the use of "running past points" should not be neglected, either in the practice battery or in the works themselves. For this very quick targets are a necessity, and two very light marks representing the bow and centre of a ship, towed with coir rope by a powerful tug, should be employed.

A battery commander should never at any practice be hampered with responsibility for the safety of the range if it can be avoided. He cannot attend properly to this and efficiently direct his fire at the same time. Every effort should be made to detail a special safety officer to each battery command.

The above proposals are put forward in the belief that they afford the only real solution of the most serious difficulties attending practice from heavy guns, and would lead to a better understanding of what are service conditions, and to greater smartness and rapidity of fire—results much to be desired. One thing is certain, ordinary practice with constant long interruptions between each few rounds has often a most evil influence on even the best men, and leads to slovenly habits and general slackness.

Aiming rifles should be supplied, where heavy guns are mounted, not singly but by groups, and if possible to all the groups of at least one battery command, for choice that which has the clearest range. Where no battery command has a clear range they should be supplied for all the guns of the practice battery. In either case the frequent use of them by all the artillery in the command should be facilitated as much as possible. With the 1-inch rifle observation of fire is fairly easy over moderately smooth water up to about 2,000 yards, and with the ·45-inch to about 1,000 yards. These distances permit the use of range-finders or position-finders in the ordinary manner, and for all cases of laying, with the exception that the ·45-inch rifle, not being adapted for electric firing, precludes the use of P.F. case III. As however this is only furnished for R.B.L. guns, B.L. guns below 6-inch and R.M.L. guns below 9-inch, no inconvenience results. When using case I. a range table for the ammunition in use is required, by the help of which in conjunction with the range table for the service charge the correct graduation at which to set the sights can be obtained. It would be better, however, to have removable range strips properly graduated for the rifle ammunition. When using case II. or III. a scale of quadrant elevation must be worked out, from the range table for rifle ammunition, in the ordinary way and temporarily attached to the mounting. The target should be, as recommended for quick-firing guns, and for the same reason, a small one at comparatively short ranges. Owing to the small dangerous distance of the ammunition, practice is little liable to interruption from a foul range. Fire direction and fire discipline of a battery command can thus be practised under conditions which will allow of very valuable experience being gained by battery commanders, position-finding and depression range-finding operators, gun group commanders, gun captains and layers, and accustom all these to working together.

The use of aiming tubes (·23-inch calibre) may be possible in some situations, and if so they should be taken advantage of to train

layers, in addition to the practice with aiming rifles. The target should be arranged on similar principles to that advocated for quick-firing guns, but no butt or artificial light will as a rule be necessary.

Those heavy guns (if any) which are provided with special case shot for repelling torpedo-boat attacks, in the absence of quick-firing guns, should be practised from under as near an approach as possible to service conditions, *i.e.*, by night and at a quick target. Paper shot or blank would probably have to be used, and the arrangements might be similar to those for blank practice from quick-firing guns.

The only possible use, as Coast Artillery guns, of the "armament for general defence" would be in repelling landing attacks. They should be occasionally practised from under this idea at a target moving towards the shore.*

The practice of machine guns over sea ranges should for the same reason be carried out at a similar target, with the exception of those grouped † with quick-firing guns, which should be practised from under the same conditions as quick-firing guns.

CLASSIFICATION OF PRACTICE.

The following classification of the proposed systems of practice is advocated:—

(a) Company elementary practice.
(b) Company service practice.
(c) Station service practice.

(a) This should consist entirely of practice with aiming rifles (1-inch and ·45-inch calibre) from the guns mounted in the defences. Where, however, it is very difficult to obtain a clear range for these, aiming rifles might be used in the guns of the practice battery; but the practice would then be less valuable as a help to testing means of range-finding, communications, etc., and accustoming details to the use of these as they would exist in war. Owing to the cheapness of the ammunition a large number of rounds should be available, and the practice spread over the entire year. No employment should be allowed to prevent a man of the regular artillery from being present at such practice at least once in every three months. Each man should attend practice as far as possible with guns similar to those to which he would be detailed in time of war. The use of service ammunition for elementary practice is a waste for which there is no occasion now that aiming rifles are approved. Every round should be carefully saved for the more instructive service practice.

Whether detailed to man quick-firing guns or not, a certain proporof every company—say a subaltern and twenty men, specially selected—should be trained to these guns, and practice with aiming rifles from them.

(b) This would consist, for those details told off to quick-firing guns at home, of the practice at the Q.F. practice camp already recommended; for details abroad, of the nearest approach to service practice that the locality, and appliances available would allow. Such details should

* See Report of School of Gunnery, 1896, Part 1, paragraph 188.
† Page 9, Amendments 1896, to G.A.D., Vol. i., 1895.

be obtained by very careful selection of the smartest officers and men in the company which is charged with furnishing them.

In companies, or parts of companies, told off to the other guns it would consist in the case of high angle fire guns of practice from the guns themselves; in the case of the direct fire guns of the practice from the practice battery for the reasons already stated. In all practice under this heading every attempt should be made to approach service conditions. Some definite tactical idea, based on the forms of attack to which the defences are liable, should be followed. Casualties to men and material should be frequently practised. The practice should never be interrupted to correct errors of drill, unless waste of ammunition is likely to ensue. They should be noted and pointed out afterwards, except when they occur frequently, in which case practice should be stopped altogether, and drill substituted. Every endeavour should be made to obtain continuous, rapid and accurate service of the guns.

Competitive practice should be included in this class, and carried out with the same regard to service conditions. In view of the immense importance of Q.F. practice it would be well that, in each alternate year at least, it should take place from quick-firing guns. This would perhaps be difficult at present, but the difficulties will decrease as the guns for which money has been voted in this year's supplementary estimates become available.

At other times the practice batteries which have been advocated should be used, or, failing these, practice should take place from the guns having the clearest range.

The above procedure would help to assimilate the conditions of practice at different stations, and might render possible a comparison of companies on a much larger scale than is practicable at present, a result which would greatly increase the keenness of all ranks, and tend to further emulation and improvement. With a view to this, and also to approaching more nearly to service conditions, a battery commander at competitive practice should be given a certain number of rounds and allowed a certain fixed time, only barely sufficient, in which to expend them, and should not be hampered by being tied down to particular "orders of fire," but allowed to use his judgment in the selection of these, one of his most critical functions in action which is put to no test under the present scheme. This originated before the word "ranging" was uttered in connection with heavy guns, and as it stands is rather too artificial, tending to cramp a good battery commander and a smart company, who gain no credit for quick ranging and rapid fire.* The system proposed has worked thoroughly satisfactorily in the Field Artillery, and steadly increased its rate of fire. It apparently has no inherent drawback preventing its application to Coast Artillery.

* The modifications in "Instructions for Practice Seawards, 1897," (published since this was written) corroborate the views expressed as to allowance of time and ammunition. The compulsory use, however, of certain "orders of fire" is still ordained, so that a B.C. is precluded from proceeding to "salvo fire" (which should rightly be used as soon as ranging is completed) until after his eighth round. Such a limitation is opposed to war conditions.

(c) This would comprise the combined practice already referred to, carried out under service conditions from all the guns, except the lighter Q.F., mounted in the defences, or from as many of them as could be manned, on the days set apart for practice under the proposed bye-laws. This practice would correspond to the present station and regimental practice, and to the ammunition allowed for it should if possible be added that sanctioned for position-finding practice,* courses being so timed as to enable them to complete instruction in time to take their places at the instruments. As at company practice tactical ideas should be followed, but in this case on a more extended scale. The blank Q.F. Practice already mentioned would be included under this head, and should if possible take place at the same time, but need not necessarily do so.

IV. CONCLUSION.

The endeavour has been made to put forward no proposals but such as it is believed are both practical and practicable, and would entail little or no additional expense. More could easily be said on the subject of Coast Artillery practice, and details which will no doubt suggest themselves have had for want of space to be left unnoticed. But when guiding principles are once acknowledged details are easily filled in. The great danger lies in the tendency, often apparent, to elaborate details first and then adapt principles to them. For this reason it seemed prudent to consider somewhat carefully the possibilities and probabilites of war. Such consideration brings out most clearly the liability of coast defences to one form of attack—Raid—and the consequent paramount importance of practice from quick-firing guns. This is a matter of the very greatest urgency, not only to Coast Artillerymen but to the country at large, which at present without doubt is not getting full value for the money spent on these guns for land service, inasmuch as there is not one man of those in whose hands they would be if war came to-morrow who has been or can be under present circumstances fitly trained to use them. When war comes there will be no time to make up for lost opportunities in this respect. For each individual concerned in the service of these guns there is no more proper motto than that which heads this essay—"Semper paratus."

* "Equipment Regulations," 1896, Part 2, Section xii., paragraph 174.

COAST ARTILLERY PRACTICE; HOW BEST TO CONDUCT IT WITH A VIEW TO THE REQUIREMENTS OF ACTUAL WARFARE.

BY

CAPTAIN N. W. H. DU BOULAY, R.A.

"ALL THINGS ARE READY IF OUR MINDS BE SO."

COMMENDED ESSAY, 1897.

It is scarcely possible to discuss thoroughly the conduct of Coast Artillery practice without introducing the question of Coast Artillery organization, but this again depends so much on the general organization not only of the Regular Artillery, but of the Militia and Volunteer Artillery as well, that it becomes necessary, in order to keep within the limits of an essay, to assume that the present organization in its main points holds good.

The inadequacy of merely learning to hit targets.

Prince Kraft's three Field Artillery rules as to "hitting" apply equally to Coast Artillery, and there is no doubt that in the past nine years there has been considerable improvement in the Coast Artillery in this respect. This has been caused primarily by the introduction of the position-finder, which not only made a direct increase in the accuracy of shooting by providing an accurate range-finding instrument, but added very much to the interest taken in practice generally and led to the development of our present system of fire discipline. Competitive practice has in some cases carried the improvement still further by rousing energies which were formerly dormant.

Unfortunately we only learn to hit targets, and our targets in some respects bear less resemblance to hostile ships and torpedo boats than Infantry targets bear to hostile troops. Infantry can follow up a retreating enemy and keep him under fire, but Coast Artillery can only fire whilst the enemy chooses to remain within range, and can only gain a decisive victory by effectively hitting the enemy within a limited time and space. And yet the field firing, field days, and manœuvres which are considered necessary for Infantry training in addition to the ordinary target practice, are practically unknown as applied to the

Coast Artillery. Many pages have been written on the "tactics" of Coast Defence, and the various forms of attack by ships have been discussed over and over again, but in spite of it all we are content to go on hitting, or trying to hit, targets towed backwards and forwards in front of our guns, and to draw the conclusion that it would be folly for ships to come within range.

Practice, with a view to the requirements of actual warfare, should include much more than hitting targets, and its object should be the attainment of readiness and rapidity as well as accuracy.

Necessity for readiness.

It has now been laid down by authority that a raid is the most probable form of attack with which our Coast Artillery may have to deal. A raid may be made either at the first outset of war—it may even be the first act of war before hostilities are declared—or it may be made after a war has been going on for some time. In either case, to have a chance of success, it ought to be sudden and if possible unexpected; and here is one of the chief points wherein our targets differ from hostile ships. No one could possibly regard the movements of a "Record," or any other target, as either sudden or unexpected. Even if no one knows the exact moment at which practice is to begin, at any rate the master-gunner knows beforehand that practice will take place from his fort on a certain day, and can arrange to have the necessary stores laid out for the occasion; and yet it is on the preparedness of the guns and ammunition quite as much as on the accuracy of shooting that success depends. Fortunately a raid is not likely to be made by a large fleet, and there is no necessity therefore for keeping all the guns of a fortress in a constant state of readiness to open fire; but certain guns ought always to be ready, and by this is meant that the process known as "preparing for action" should not be necessary; stores should be with the guns; range-finding instruments should be set up and adjusted, and two or three rounds of ammunition should be immediately available. A sufficient number of men must also live on the spot to man the guns in case of need. Of course if it were our custom to prepare for action whenever our relations with a foreign power were strained there would be no need for these precautions, but we cannot count upon this being done; it is more likely that preparations would be postponed till they were too late, from fear lest they should themselves precipitate the war. Certain guns must therefore always be ready. After war has broken out and our ships have got a grip of the enemy, there will be time to complete the manning of the other guns; but in the hours immediately preceding and immediately after a declaration of war our Coast forts must share with our Navy to a certain extent the honour of forming our front line, and must be in a sufficient state of readiness to repel a raid.

If there is any reason for the existence of a fort there will be some advantage to the enemy in destroying it, and, apart from an attack by torpedo boats, perhaps the most probable object of a raid would be the destruction of one or more forts. It is clear that if a fort is unprepared a ship can go in to close quarters and render it useless in half-an-hour, and it is our business therefore to be in a position to bring such a fire to bear at a moment's notice as will keep a ship at long range or sink it if it comes to close range. There are of course many forts which from their position would be comparatively safe, and would not need protection against this form of attack, but these very forts would probably be the best to utilize for the protection of the exposed forts, and it

would be found that a few guns for each water area, if kept constantly prepared for action, would afford sufficient protection. The guns selected must be able to bring a sufficient fire to bear, must have accommodation for detachments close at hand, and must be manned by Regular Artillery who must always live on the spot. We cannot count upon knowing that war is imminent sufficiently early to be sure of sending men from elsewhere in time. The delay that sometimes occurs in returning the salute of a foreign man-of-war is a sufficient indication of what might happen in war if readiness is not insisted upon.

Practice to test readiness.

But how is practice to be arranged so as to test our readiness? To this question the only possible answer is that blank ammunition must be used, and the Navy must be asked to co-operate. Single ships are constantly moving about from place to place, and it seems a very small request to make that a captain should occasionally, when leaving a port, receive sealed orders that before entering the port for which he is bound he should open fire with blank ammunition at one of the forts defending it. Very few rounds would suffice, and the test of readiness would be the rapidity with which the fire could be returned, not necessarily from the fort attacked but from any fort or forts which may be able to bring a fire to bear. This will show us where our arrangements require improvement, will bring home to us the necessity not only of being ready but of keeping a sharp look out, and will ensure such orders being issued as will prevent any hesitation or delay on the part of those in immediate command of the guns. A few rounds of blank ammunition must be kept with the guns for this purpose.

In some cases warning might be given by other ships or by the Coast guard of the approach of a man-of-war, but still its intentions would not be known until it opened fire. This would give invaluable practice in the communication of information to those most concerned.

It may be thought that all this readiness would entail too great a strain on the detachments; but they need not always be on the alert; all that is required is a look-out man with communication by electric bell with the forts; the detachments themselves would have more nights in bed than if they were doing ordinary duty with their companies, and it should also be borne in mind that the guns to be held in readiness need not always be the same, and that detachments could therefore be relieved without any difficulty.

After war has broken out our readiness must be extended to the protection of commerce. It is our business to provide places of refuge, where merchant ships can be safe from the attack of hostile cruisers. By night we can only afford safety within our defences, but by day the safe area can be extended considerably according to the range of our guns. Something of the sort is even now practised at Gibraltar, where the Spanish Guarda Costas are not allowed to pursue smugglers within the three mile limit. But we must know how to distinguish friend from foe, and avoid firing at one of our own cruisers when in pursuit of an enemy's ship; and in admitting our own merchantmen, we must be careful to exclude those of the enemy which may run in to reconnoitre. Examination anchorages are good in theory, but we must have practice in communicating with the examining boats and in acting promptly on the information so obtained. No practice however in these various duties can be obtained without the co-operation of the Navy, and we must look to the Navy to help us in these matters. It is not very much to ask. Ships are constantly moving about from place

to place, and torpedo boats are constantly being exercised, and there seems no reason from the landsman's point of view why they should not be able in the course of their ordinary routine to give immense assistance in the training of the Coast Artillery.

Again, when the Naval manœuvres are going on, it would give very good practice to the Coast Artillery if a fortress commandant were warned that a hostile squadron had put to sea from some given port, and were told to take all measures possible, with the means at his command, to make ready for an attack by the squadron.

Such practice as this is just as essential for Coast Artillery as Field days and Field manœuvres are for Infantry, and blank ammunition should be used in the one case just as it is in the other, a certain annual allowance being authorized in addition to other practice ammunition.

We have two classes of forts in our Coast defences, those manned by Regular Artillery and those manned by the Militia or Volunteers. The former should be kept in a constant state of readiness, and every opportunity should be taken of testing that readiness all the year round ; the latter must be put in a state of preparation by the process known as "Mobilization" as often as possible, though this will hardly ever occur more than once a year, and in most cases not so often. When mobilization has taken place the readiness of these forts must also be carefully tested by practice.

It may be objected that, though this readiness may be of the greatest importance, it does not properly speaking come under the heading of "practice." But in answer to such an objection it is contended that just as changes of position, methods of coming into action, supply of ammunition, and transmission of orders are part of the course at Okehampton and form subjects for criticism by lieut.-colonels and the camp commandant, and depend upon the training that has gone before, so everything that leads up to the firing of a Coast defence gun at the proper time, at the proper target, and with the greatest amount of rapidity and accuracy possible, should form part of the practice of the Coast Artillery.

Necessity for rapidity.

An article by Major-General Richardson, in the "Proceedings of the R.A. Institution," March, 1897, has brought home to all who have read it the great importance of speed in firing with Garrison Artillery guns, and our shortcomings in that respect.

How rapidity can be improved.

These shortcomings he attributes to a variety of causes, but there is one cause which, at home at any rate, is perhaps of more importance than any which he mentions, and that is not merely the unsuitability of our methods of drill but our actual lack of drill.

It is the custom to tell off companies to certain forts which they should man in time of war, but it rarely happens that drill at those forts is the principal work of the companies throughout the year. Such drill as they get is spread over a great variety of forts and guns, and when the annual course comes round they naturally turn their attention principally to the guns from which the competitive firing will take place, instead of making themselves as perfect as they can be with the guns which they would have to fight in war.

Improvement in material will never be made unless it is urged by those who have to fight the guns, and company officers will never urge improvements unless they realise that they are responsible for maintaining certain guns in the very best condition possible for war, and can see by constant drill and practice from those guns in what ways they can be improved.

As things are at present, the energies of officers and men are diverted into all sorts of different channels, instead of being concentrated upon the one thing for which they exist, namely fighting particular guns in the most efficient way possible. It is not an uncommon thing to hear it said that a recruit should not do 12·5″ gun drill because he has not yet done any 64 pr. or 9″ gun drill; but surely if the company to which he belongs has to man 12·5″ guns in time of war, it is of vastly more importance that he should learn the 12·5″ gun drill than any other. When he has learnt it and become efficient at it he will no doubt be all the better for learning how to work other guns, but his early instruction in the work he would have to do in war will not militate against his general efficiency as a gunner; and if he is sent abroad with a draft, before war breaks out, his knowledge of 12·5″ gun drill will be just as useful to him as knowledge of 9″ or 64 pr. drill. It is a common complaint in the reports of the commandants of schools of instruction that there are so many recruits in the companies. This implies that the recruits do not know their drill, but it would often be found that they had excellent knowledge of the bayonet exercise and other things, which no doubt are of use, but which would have very little effect on the course of a fight between ships and forts. If their want of knowledge were due to the fact that they had been drilling only with those guns which they were told off to man in time of war, it would be a matter of congratulation to the companies, even though it were still a subject of complaint by the commandants.

Unfortunately now-a-days when a gunner emerges from the recruit stage he has little chance of learning his work unless he goes abroad. A company is spread out over so many sub-districts and offices that what with district gunners, specialists, office clerks, and armament fatigues there are hardly any men left for drill, except during the annual course, and they then generally drill with the wrong guns. The truth is that a considerable change in our methods is wanted, and the following system is advocated :—

Proposed scheme for care of forts and training of companies.

The most important works of a fortress, that is those in which some or all of the guns should be kept constantly ready, should be manned by the Regular Companies. A company major should have entire charge of the work or works manned by his own company, and of none other except such as are in close proximity and belong to the same sub-district. Two sub-districts might be under one officer's charge; but one sub-district should never be shared by two officers.

Each subaltern officer of a company should be responsible to his major for that portion of the works manned by his section of the company, and if there are three subalterns in a company there should always be three sections. The other works in a fortress which would be manned by Militia or Volunteers (except such as form part of the company sub-districts) should be under the charge of armament officers; and as a general rule, company officers and men should have nothing to do with them. It is possible that a closer connection might be established between the Militia and Volunteers (at any rate those whose headquarters are on the spot) and the works which they have to man, so that the district establishment in those works should become practically part of the permanent staff of the corps.

There seems no reason why a Militia or Volunteer adjutant, whose headquarters are in a fortress, should not have armament charge of the sub-district or sub-districts manned by his corps, but of course if his

headquarters are elsewhere this would be impracticable, and an armament major or district officer would have to do the work.

At present there is considerable diversity of system in different districts in regard to the armament charge of the forts. In some cases company majors are accountants, but are responsible for more works than their companies could possibly man. This is a serious matter if the works are long distances apart. Sometimes the company majors are in armament charge of works which would be manned by Volunteers, and have nothing to do with the works which their own companies would man. In other cases again company majors are not accountants, but are given a general supervision over several sub-districts. This arrangement has the serious disadvantages that the master gunners have to serve two masters, and that there is a divided responsibility for the condition of the armament.

Unless a company major can have sole charge of his own forts he cannot be held responsible for their efficiency, and there is no guarantee that the armament will be kept in the best possible condition for fighting; and unless his charge is limited to those forts to which his company is allotted for war, he cannot properly train his men for their duties in war.

If our present system were extended to the Field Artillery, each Field battery at home would have charge of the equipment of half-a-dozen Volunteer Field batteries, not all collected in one gun-shed but distributed over a distance of several miles and standing in the open; and even then the Field battery would have an advantage over the garrison company, for the officers of the former are mounted and could go from one place to another without much loss of time.

Of course it may be said that the district establishment is not numerous enough to properly look after all the forts belonging to the Militia and Volunteers, and that it is therefore necessary to utilise the Regular companies for this purpose. If so, there is an opportunity now of increasing the district establishment; but if there were no increase in contemplation it would be better to have some of our forts in a thorough state of readiness for war as regards both the armament and the training of the men, and to let the other forts slide, than to run the risk of finding none of them really ready for an emergency.

Proposed scheme for practice.

Having dealt with the general question of preparation and training for practice, let us now turn to the question of "practice" itself, as the word is generally understood at the present time.

We have to deal year by year with companies largely made up of recruits and young soldiers, and very often with young and inexperienced officers; and it is essential therefore that a certain amount of ammunition should be utilized every year for purely instructional purposes. The larger the number of rounds that can be made available for this instruction the better.

Specialists must have the opportunity of seeing tke effect of their range-finding and predicting; layers must learn by experience the necessity of good laying; quickness and accuracy in reading dials and passing ranges must be brought home to all concerned; but above all officers require practical experience of judging how shots are falling and of making the necessary corrections quickly.

Light guns are just as good as heavy guns for these purposes and light guns should therefore be used, for their ammunition is cheap and a sufficient number of rounds can be expended at a small cost.

In carrying out this preliminary practice it is most essential that not only the major of a company but the other officers also should have ample opportunities of commanding. Most modern forts are constructed for only two or three guns, and subalterns will often find themselves in time of war no longer "group commanders" but "battery commanders," and even where there are many guns in a fort there will probably be groups which must be worked independently ; whilst at any time a major or captain may be placed *hors de combat* and a subaltern would have to take his place.

By the present regulations each company is allowed, for company practice, 140 rounds of 64 pr. ammunition or its equivalent in value. For the preliminary practice mentioned above each officer should fire two or three series of six to eight rounds each, including shrapnel shell in one of them ; say twenty rounds for each officer, or 100 rounds for a company. In order to be able to fire so many rounds 64 pr. guns must be used, and where they are not available in the armament of a fortress practice batteries must be made. Slight alterations must also be made in the ordinary mountings of such guns so that traversing may be carried out as with heavier guns, and quadrant elevation be given. Traversing arcs must also be laid.

The rest of the annual practice of a company should be carried out entirely from the guns which it mans in time of war. If money were no object there would undoubtedly be advantages in taking companies from fort to fort and giving them a general training in the use of as many guns and forts as possible, but every penny that can be obtained in present circumstances should be devoted to the far more important work of training companies for their actual duties in war. The personnel of a company changes now-a-days so rapidly that there is no opportunity of giving a company, as a unit, a general education in gunnery as well as a special training with its own guns ; individuals however will still have a great variety of training, since they frequently change their stations either with their company or as drafts for companies abroad.

Our present schools of instruction, though they have undoubtedly done much good, act directly against the principle of training companies for war. It is manifest that a company told off to a Spithead fort would be better prepared to fight if its annual practice were carried out from its own fort instead of taking place at the Needles. Practice at the Needles is no doubt of great use, but it cannot compare for the requirements of actual warfare with practice from the Spithead fort. It may be urged that more rounds could be fired from the guns at the Needles for a given money value ; but a quarter of this number, if fired from the Spithead fort, would be a better training for war, provided that the preliminary practice mentioned above had taken place. The only case when a company should practice elsewhere than at its own fort is when a clear range cannot be obtained in front of it, but if companies were allotted as urged above this would very rarely occur, for the "important" forts must almost always form part of the outer defences, except those armed with quick-firing guns for defence against torpedo boats, which will often command the inner waters. Where such cases occur the best arrangements possible must be made locally, and a fort as similar as possible to that to which the company is allotted must be selected for the practice.

There is too great a tendency in our present arrangements towards

teaching a cut and dried system of fire command, which requires endless modifications and adaptations to suit the numerous varieties of trace, construction, communications, and ammunition supply to be found in different works—varieties which are of quite as much importance in the question of training men for war as varieties in the armament itself, and this should be borne in mind in selecting a fort for practice when a company cannot fire from its own.

Whenever practice takes place all the communications which affect the fort or forts involved should be worked. Part of the practice will be purely company, or "fort" practice, but part of it must be reserved for combined practice with other companies and forts; and this combined practice must include a concentrated fire from several forts at one target. It requires considerable practice to readily distinguish between the splashes caused by simultaneous shots from two or more forts when firing at the same target, and in war this uncertainty would be increased by the smoke of the enemy's guns, unless he were using smokeless powder. Concentration of fire can often be carried out with a towed target, but if there is any risk a drifting or sailing target can be used.

Suggested improvement in loading arrangements.

By keeping companies to their own forts both for drill and practice there ought to be a great gain both in readiness and rapidity of firing; but rapidity of firing cannot be kept up for any length of time with heavy guns owing to the labour involved, which soon wears men out. Sailors on board ship are much better off in this respect than gunners on shore, because they almost always have the assistance of adequate mechanical appliances for bringing the ammunition up to the muzzle or breech of the gun, and considering that most of the time taken in loading a heavy gun on shore is spent in hoisting the projectile, it is somewhat surprising that no steps have been taken to make this operation easier and quicker. There is a simple contrivance used with Krupp's mountings which might easily be applied to many of our guns and would save a vast amount of time in loading. It consists in making the head of the loading derrick itself capable of dipping to the gun-floor so that the projectile may be attached to it. The derrick is hinged to the slide and has a continuation below the hinge. As it dips, this continuation compresses either the air in a cylinder or a strong spring attached to the slide, and when the head is low enough a catch retains it in position. For raising the projectile the catch is released, and the derrick rises without any difficulty, bringing the projectile to exactly the right height for loading. The whole movement is under the control of one man by means of a winch handle. The time saved in raising the projectile is of course taken up in lowering the derrick, but the latter is done during the ramming home and running up, so that there is no loss of time on that account. Possibly a counterweight could be arranged more easily than an air cylinder or spring; and even without altering our derricks a slight change in the arrangement of the tackle could be made so that a counterweight could be raised, whilst the other operations of loading and firing were going on, which would in its turn serve to raise the projectile for the next round when required.

Proposed alterations of drill.

But apart from the question of the time taken to load there is no doubt that with our present system of fire control the delivery of a rapid and accurate fire from a fort requires a very high degree of training on the part of all the officers and non-commissioned officers and of most of the men. From beginning to end of a practice series

there is a constant and severe strain on many people, and the chain of communication, from the finding of a range to the firing of a gun, is very liable to fail at one or more of its links. Any change therefore that will simplify the various operations without marring the results will be of great benefit.

Already a beginning has been made by allowing gun layers to fire the guns themselves, and one source of uncertainty and error has thus been eliminated. But the principal change now advocated is that the range indicator should show the elevation to be given to a gun or group, instead of showing a succession of varying ranges as found by the range-finder. This elevation would be ordered by the battery commander from his post near the range-finder, and when the range of the target approached that for which the guns were laid he would order "commence firing." The effect of this change would be to give the battery commander the control over his fire which he so much lacks in our present system. The difficulty now experienced by a group commander in realising the speed with which changes of range are occurring would disappear, and the "fresh lays" caused by his under-estimating this speed as well as the delays caused by his over-estimating it would thus be eliminated. Group commanders would no longer be required in small works; and in large works, relieved from the strain of ordering elevations, they would be able to turn their whole attention to the real superintendence of their commands, a matter of the greatest importance in actual warfare when casualties might be occurring out of sight of the battery commander. They would still however be responsible that gun captains were making proper allowances for displacement. Lastly, the work of the range-indicator numbers would be very much simplified. It is true that the battery commander would have more to do than he has at present, but it would not be more than he could easily manage; and he would be amply repaid for any extra work by the far more satisfactory control he would obtain over the firing of his guns. Certain details would have to be considered for each work, and experiments made to arrive at the best drill; for example the order to commence firing might be given in various ways—by signal, by sound, by word of mouth, or by some device on the range-indicator. But it is confidently held that with good drill this system would work with the same rapidity and greater ease than the present one, even though the battery commander should have a number of groups under his control. Even with the present system, however, he would rarely have to command more than two groups at the same time, for the simple reason that three groups in a fort never command quite the same water area, or if they do, the grouping is wrong.

Any change which would do away with the shouting of the dial readers when working with the position finder would be a great improvement. Shouting tends to confusion; and ranges and trainings passed in this way are very liable to be wrongly read or wrongly heard even in ordinary peace practice, whilst in actual warfare there would be still greater chance of mistakes. With the dials now in use, however, it is difficult to suggest a remedy. If case II. only were used it would be very much better to place the dials at the battery commanders station instead of at each gun or group. The drill would then go on exactly as though a depression range finder were being used; the shouting would be reduced to a minimum, and two drills for case II. would not be necessary.

Another improvement, when case III. is employed, would be the abolition of electric firing. Accidents are now prevented only by the greatest care and vigilance ; and there seems no reason why an electric bell should not be rung as a signal for firing, instead of the gun being actually fired by the observer at the position finder. The "time of firing" would be very small, and, if necessary, allowance could be made for it ; and the relief to the mind of the group commander and to the nerves of the gun detachment would be very great—matters of no small importance in war. If electric firing were abolished for case III. it would disappear entirely from the drill book, and the forts would be well rid of some useless stores.

As a matter affecting accuracy, some attempt should be made to lengthen the radii of the index plates.

Practice from quick-firing guns.

How best to conduct practice from quick-firing guns is a problem which cannot well be finally solved until the question of automatic sights has been settled, but in dealing with the subject there is one tendency which is beginning to show itself which should be carefully avoided. This tendency is to throw the whole fire control into the hands of the men who lay the guns. Such a system or rather want of system would be a fatal mistake. Rigid fire discipline is more absolutely necessary with quick firing guns, firing at a very rapidly moving target, than it is with heavy guns.

The practice of the Navy in this respect can be no guide for the Coast Artillery, for the conditions of an encounter between ships at sea are entirely different from those of the defence of a passage or minefield. To give the gun layers control means that each gun will be fired independently ; fire might be opened by mistake at friendly boats and there would be no means of stopping it, or hostile boats might be allowed to run in and there would be no means of ensuring the commencement of firing ; observation of fire would be hopelessly confused ; concentration of fire would be purely accidental. Night fighting is bound to be difficult, and our endeavour therefore should be to institute as perfect a system as possible, instead of leaving things to chance.

Automatic sights will no doubt simplify matters ; the officer or N.C.O. in command will be able to confine himself to the orders for commencing or ceasing fire and to the rate and nature of fire, without troubling himself about ranges and elevations ; but automatic sights are still under trial, and there are low-lying batteries where automatic sights cannot be used.

The ranging described in the drill book has one or two very serious disadvantages. To begin with, unless the opening shot falls at a suitable distance in front of the target, time must be lost, and if it happens to have fallen in rear of the target there may be a very considerable loss of time before an effective fire can be opened. Loss of time is of course fatal.

Moreover, the system depends entirely on observation of the ranging shots. This should be fairly good provided that the sea is calm, and that no other groups of guns are engaged ; but with a choppy sea, or when other groups are firing, it would be an accident if a particular shot could be correctly observed.

No better plan can be suggested than to follow the system of firing with depression range-finder (as proposed above), with slight modifications, the range-finder itself being modified so as to work more rapidly than the existing pattern.

A battery of Q.F. guns should include as many (firing over approximately the same water area) as one officer can command by word of mouth. The range-finding station, which should be the post of the officer in command, should be as near the guns as possible. On a torpedo boat being sighted, the range-taker would follow it with his instrument. The officer in command would order a range for the guns, and as soon as the boat was within fifty yards of this range he would order "Rapid fire—commence." Firing would continue until the officer observed that it was no longer effective; he would then order "Stand fast," would give a new range, and would continue as before. A whistle would probably be found of great advantage for ordering "Stand fast."

One of the most important points to be arranged for and practised in connection with Q.F. guns is the receipt of the earliest possible notice of the approach of torpedo boats. Detachments cannot remain at their guns all night and every night peering into the beam of an electric light for boats that may never come. But this early notice is a great difficulty. It would seem, however, that the best way to manage it is to have at least two distinct areas lighted up by electric light; an outer area in which hostile boats should be detected, and an inner area in which they should be sunk. Q.F. guns should be mounted to command the outer area, because they may have chances of firing a few rounds as the boats approach, and may often be able to sink a retreating boat; but the main defence by Q.F. guns should be at the inner area, for the ranges will generally be short and the detachments can be roused in time. It is, of course, of the greatest importance that proper accommodation for the detachments should be provided close to their guns, and there should be a strict rule that all Q.F. guns should remain mounted and ready for action at a moment's notice. They can be protected if necessary from the weather by a water-proof covering which can be removed instantly.

It may be assumed that Q.F. guns will be chiefly required at night, but actual peace practice at night is too risky to be attempted unless special batteries are made for the purpose, and it is doubtful whether this is worth doing, because the conditions with regard to the positions of electric lights and the facilities for observation of fire must necessarily be different from those obtaining in the actual defences. For night practice it would be far more useful that men should be exercised with blank ammunition in laying their own guns with the aid of the existing electric lights, in varying conditions of weather, than that they should be exercised in actual firing from special practice batteries. It is of course, necessary that actual firing should be carried out by day, and if detachments can do this from their own guns, so much the better; but this cannot always be the case, especially in the inner defences of a fortress. In such circumstances they must carry it out from guns (placed in special practice batteries if necessary) of the same calibre, mounted in the same manner, and at approximately the same height above the sea as their own guns. The ranges for such practice should also agree as far as possible with the ranges at which their own guns would be fired in case of attack, *e.g.*, if certain guns are told off for the defence of a narrow channel, practice at short ranges will be more useful to the detachments than practice at long ranges.

Remarks on service conditions.

It is of course necessary that service conditions should prevail at all fort practice; this is already laid down by our regulations, but it is often forgotten that the presence of certain specialists, such as the

I.O.M. and the I.R.F., introduces a condition which is not a service one. These officials cannot be everywhere at the same time in actual warfare, and their presence tends to make the officers carrying out practice too much dependent on them.

As regards the I.O.M.'s department, there should be a sufficient number of armament artificers available to allow of their being distributed throughout the coast defences at the rate of one to every large fort or group of important works; and each armament artificer should have one or more machinery gunners or other artificers to assist him. These should all be told off to their appointed places for war, and should as a general rule attend all practice from their own forts; but their work in war will be to repair damages, not to carry out the duties of officers and gun captains, and in peace practice they should be kept to their own work. For example, in the case of a H.P. mounting, if a valve is out of order an artificer must repair it, but it is not part of his duty to see that the air pressure in the cylinder is correct. Of course, until officers and gun captains can be said to have their own guns only to look after and know, in the same sense as officers of the Field Artillery have, it is difficult for them to be sufficiently familiar with the mechanism of the mountings.

The same principle applies with regard to the I.R.F. and the position-finders. As an instructor, the I.R.F.'s duties should have ceased before a company does its fort practice. The instruments should be entirely in the charge of the company major, and the specialists entirely under his command. If anything requires repair, or if anything is so much out of order that the specialists cannot deal with it, the services of the I.P.F. or I.R.F. and his artificers must be requisitioned. There is probably nothing which has militated so much against the efficiency of the position-finders as the introduction of specialists and I.R.F.'s. Company officers have gradually come to consider that it is no part of their duty to look after the instruments, and the I.R.F.'s have been unable to manage the whole business themselves.

An I.R.F. may be of great use, of course, to a company major when a company is doing its preliminary practice, and he should certainly attend during part of the time as a spectator to see that specialists are carrying out their duties in accordance with the drill book. Moreover, he may very likely be told off to take charge of some important group of instruments in war time, and he should be in his place whenever these instruments are used for practice.

Targets.

There is little to be said about targets which has not already been said over and over again.

The great want is speed, and that depends more upon the towing launch than upon the target; but the present heavy record targets are ill adapted for speed, and should therefore be seldom used, except at the longest ranges, when they would represent ships steaming slowly past. In such cases, the range should be at least 3,000 yards. For all other purposes, provided a target is clearly visible the smaller it is the better. There will be less chance of its being destroyed and practice will therefore be more continuous; it will be cheaper and more easily towed.

Schools of Instruction.

If the changes set forth in this paper were introduced, two important questions would have to be considered. First, what is to become of schools of instruction? and secondly, how should competitive practice, if it is retained, be conducted?

When our present system of fire-command was first introduced, an expansion of the school of gunnery was perhaps necessary in order to instruct as many officers as possible in the new drill. But this drill is now old, and the benefit derived from schools of instruction is therefore much less than it was when they were started. The object of a school is either to teach old pupils something new, or to teach new pupils the old lessons; but our schools of instruction now do little more than teach old pupils the old lessons. There are, of course, a few new pupils every year, but they can be taught very well regimentally without going to school, and certainly without dragging their companies to school with them too; and they are not numerous enough to warrant the maintenance of the schools. No doubt companies benefit very much by undergoing a course at a school, but they would benefit equally by a course under their own lieutenant-colonels. There is no reason to suppose that the latter, if they had the opportunity, would not be as capable of keeping companies up to the mark, and even of recommending and trying new methods, as the schools of instruction. The very fact that these schools exist diminishes a lieutenant-colonel's interest in the training of the companies under his command, and to that extent does harm. Moreover, a course under a school of instruction almost always involves a large amount of drill and practice in forts which will not be manned in war time by the company concerned, and, however good the instruction so obtained may be, it cannot be compared with the instruction that would be afforded by keeping companies in their own forts, assuming always that the object of such instruction is to prepare companies for the requirements of actual warfare.

Our schools of instruction are not like that at Okehampton. There the batteries are armed and equipped alike, and practise with the guns which they would use in war. The chain of command, and the ammunition supply are the same as would be used in war; moreover the course at Okehampton is only a small part of the annual training for war which a battery undergoes.

Again, our schools are not like the Naval Gunnery schools. The latter train officers and men to be instructors, but a ship's company does not go aboard a gunnery ship to carry out its annual practice. It remains on board its own ship; and not only that, but each gun detachment remains with its own gun throughout a commission. No wonder that their speed in firing is greater than ours!

It is contended, then, that company courses under schools of instruction, though useful for general educational purposes, have a mischievous effect as regards training the companies for war, and should therefore be abolished. This does not, however, necessarily imply that the schools themselves should be abolished. It often happens that individuals, both officers and men, require special training, and the Militia and Volunteers present a wide field for the energies of the schools; moreover the instructors would always be of use in criticizing practice reports, in assisting company majors and lieutenant-colonels in carrying out practice, and in advising the C.R.A. in all questions relating to changes of armament, arrangement of communications, and other matters connected with the artillery defence of a fortress.

Competitive practice has been of considerable value from a peace point of view; it has supplied an incentive to all ranks to do their best, both in preliminary training and practice. For the purposes of war it has, as it is now carried out, one good point, and that is that it lays

Competitive practice.

stress on the importance of obtaining decisive effects with very few rounds. Theoretically, a company will have attained perfection as nearly as possible by the end of its annual course, and it must then abide by the result of its competitive rounds. If it fails in this it might equally fail when its opportunity comes in war. Such an opportunity will not be extended over several weeks, neither should competition, as has been suggested, be extended over the whole service practice of the company. There should be no talk of flukes and bad luck; these must be eliminated by the previous training, or we shall not be able to count upon hitting our enemy's ships in war. But competitive practice has also a grave disadvantage; it leads companies to expend their energies in learning to work with one particular class of gun in one particular fort, and to neglect to that extent their proper war training. This is a very serious matter when the annual course affords the only chance a company gets of learning to fight. The hundred and odd pounds expended by each company in the competitive practice and in the preliminary practice with the same guns, which is generally allowed just before the competitive, would be much more usefully expended, if the requirements of actual warfare are taken into consideration, in providing additional ammunition to be fired from the guns which the company mans in war.

The suggestion that 6″ B.L. guns should be used instead of 9″ or 10″ R.M.L. for competitive practice, is not considered a good one because for a long time to come, at any rate at home, companies are more likely to have to fight R.M.L. guns than B.L.

This disadvantage attached to competitive practice outweighs the advantages derived from it; but if annual practice in the future were carried out as recommended in this essay, it is possible that some of the preliminary practice with 64 pr. guns might be made competitive without doing serious harm.

Conclusion.

To sum up, the principal proposals which have been made are as follows:—

(1.) To keep certain guns in a constant state of readiness so that, in case of sudden attack, a hostile squadron would run great risk in trying to attack a fort at close quarters.

(2.) To ask the Navy to help us in obtaining that practice in keeping ourselves ready for war which is essential to success, but cannot be obtained without their co-operation.

(3.) To concentrate the work of companies, as regards charge of armament, daily drill and annual practice, as much as possible upon the forts which they would man in war; since this is the only way in which practical knowledge of how best to fight the forts can be obtained, and that proficiency in drill secured which will alone give us a proper standard of rapidity and accuracy.

(4.) To improve the means for hoisting projectiles, and so save much time in loading.

(5.) To make certain alterations in drill, in order to secure better fire control and greater simplicity and safety.

(6.) To work out a sound system of fighting Q.F. guns, instead of allowing layers to work them independently.

(7.) To keep the I.O.M. and I.R.F. and others to their proper work.

(8.) As a consequence of other proposals to abolish company courses under schools of instruction, and competitive practice as now carried out.

Of these proposals by far the most important is the third. Unless it is carried out, it is almost impossible to make the practice of Coast Artillery a real training for war.

COAST ARTILLERY PRACTICE; HOW BEST TO CONDUCT IT WITH A VIEW TO THE REQUIREMENTS OF ACTUAL WARFARE.

BY

LIEUTENANT C. G. VEREKER, R.A.

"THE SIMPLER THE BETTER."

COMMENDED ESSAY, 1897.

Requirements of Coast Artillery in war time.

WHEN next this country is engaged in a European war, there is every probability that Coast Artillery will be called upon to play a very prominent part, and the manner in which it will then acquit itself, will greatly depend upon the discipline and experience gained by practice in peace time.

It is necessary that all ranks should fully realise what they may be called upon to do, in order that they may take a real interest in practice and drill; especially is this the case with young officers, who too often are led into the belief that they will have no prospect of seeing service in the "Garrison Artillery," and who consequently try to get posted to the mounted branches, or do not take the interest in their work, which they otherwise would.

One often hears officers say we have no chance of service, or even going so far as to call us a "non-combatant" branch; but a moments reflection will show, that in our next great war, our first, and perhaps only line of offence and defence, will be our Navy, supported by our coast defences at home and abroad, and that, at all events, until the Navy has got complete command of the sea, coast defence troops are more likely to be engaged in active service than any others.

It is therefore of great importance that Coast Artillery should be closely connected with the Navy, in order that they may understand each other, and work harmoniously together in peace and war, and with a view to this, communication by signal and semaphore with H.M's ships should be encouraged.

In time of war, it is probable that torpedo boats will be attached to every defended port, and may be sent out to sea to watch for the enemy's approach, and to give timely warning to ships in harbour and to the defences. It would then be of great benefit to all concerned, if torpedo boats could be more often practised in communication with Coast Artillery, and lent by the Navy to act as quick moving targets, for practice with blank from Q.F. and other guns, by day and night.

Most probable form of attack.

The form of attack we are most likely to meet with at coaling stations and protected dockyards, will be sudden raids by torpedo boats or fast cruisers, for the purposes of destroying shipping and coal supplies, and it is of vital importance that these should be defeated.

It seems to be generally agreed by authorities in such matters, that no enemy would risk the loss of his ammunition in a general bombardment, if there was any possibility of a subsequent engagement with our ships; but sudden attacks are more than probable, even if we have command of the sea, as fast fleets may easily elude their superiors, as illustrated only last year in the French Manœuvres, and Admiral Seymour's getting into Lough Swilly. By running through the defences, or covering an attack by torpedo boats, they could in a very short time do incalculable damage. It is then against this form of attack that we must be best prepared, and our practice should aim at getting all concerned into the way of acting quickly and with decision, and the importance of carrying on a rapid fire should be emphasized. Quicker moving targets should be supplied and the ranges made to alter more rapidly; turning on the fire of guns, from one target to another, without delay, should be more often practised, and the object should be to get as many rounds near the target, in as short a time, as possible, consistent with fair accuracy, and not sacrifice everything to the mere object of hitting a far smaller objective, than any we would meet with in action.

In stations liable to such, torpedo boat raids and running past attacks should be constantly rehearsed, the Navy being asked to assist by lending one or two torpedo boats, as before suggested, and at every station all possible forms of attack should be thought out and represented, both at drill and practice.

Necessity for simplification of details.

In war time a great part of our home coast defences would be manned by Militia and Volunteers, and although the gun detachments could very soon be got into good drill, the officers, some of whom would have responsible commands, often do not get sufficient opportunities in peace practice to become thoroughly at home in all the details of the various methods of ranging, etc.; there would also be reserve men coming in, and detachments of regulars sent out to certain coaling stations, differently armed perhaps to the station they have been serving in. For these reasons, everything should be made so simple and clear that a very little drill would get everyone into good working order, and the first step necessary to do this would be to assimilate as far as possible the systems of ranging and fighting guns, whether by P.F. or D.R.F., so that the one drill may do for both, and a battery command pass without hitch from one to the other.

Casualties.

When in action, everything must be so arranged that casualties may be replaced rapidly and without confusion; the next senior must always be prepared to move up one step and take command; all officers should understand the various systems of ranging, and what is to be done in the case of any instrument getting out of order; in every detachment there should be men capable of replacing the gun captain

or layer; sergeants should always understand G.G.C's. work, and the range-finding detachments be able to work independently.

The training requisite to carry out all or any of these various changes, can only be gained by actual practice with guns firing at a target, and for this reason, whenever practice is carried out, a certain number of "casualties" should occur. Of course this can be, and is often done at drill, but drill conditions are generally so different to service conditions, that we do not realise the necessity for rapidity in at once taking up duties, or changing from one system of ranging to another.

Communications.

The effectual handling and ranging of coast guns is greatly dependent upon communications, and in action a certain number of breakdowns are bound to occur.

Even in peace practice, telephones, etc., are constantly getting out of order and the working of the guns delayed from this cause. How much more then would this be the case, with the enemy's quick fire guns pouring in their projectiles, splinters of which are pretty sure to cut some of the many wires upon which effective communications depend.

It is most necessary to be prepared for such an occurrence, and to have a pre-arranged code of signalling for passing orders, etc., and constant practice in its use. It would be an excellent thing if it were insisted upon that all telephone operators should be qualified signallers, not necessarily able to send or read the morse code at fancy rates, but to know the semaphore sufficiently well to send and read about twelve words a minute. The semaphore is at last recognised as the authorized system for use by Coast Artillery, and it is so easily learnt that there should be no difficulty in making all men connected with communications acquainted with it, so that in the case of a breakdown the operators could carry on by signal. Positions for them should be decided on, and at drill and practice they should be exercised in passing messages in this manner.

A certain number of men should also be able to read the more common flag signals in use by the Navy, as this might prove invaluable in war time, and is found a very effective way of communicating with the tug at target practice.

CRITICISM OF PRESENT SYSTEM OF PRACTICE.

Let us now examine our present system of carrying on practice, and see where it fails in representing the conditions of war time, suggesting some possible remedies. With the exception of the difficulty of getting a clear range, which will be referred to later on, the chief cause of our inability to represent what would occur in war time, is the want of a really good target.

Targets.

Since the introduction of the record target, the shooting of Coast Artillery has undoubtedly greatly improved, but yet it is by no means all that could be desired, nor can this form of target be said to meet with general approval.

For competitive practice the record target is useful, as it accurately records any hits, and does not leave the classing of a company to the observation of an individual. But even for this purpose it is not so satisfactory as it might be, and it is to be hoped we shall in time get one which will travel quicker and not collapse when struck by a salvo.

As a target for ordinary practice it fails entirely; it can rarely be towed faster than 4 to 5 knots, except in special cases when fast tugs are provided, whereas in war our targets may be moving 15 to 25 knots;

having to be towed it cannot approach at a less angle than 45° to the line of fire, only a limited number of guns can fire at it at the same time, and cross fire from several groups is generally impossible ; when firing at it the tendency is to sacrifice everything to extreme accuracy, at the expense of rapidity, which, at all events in the case of ships trying to pass the works, would not be the case, as in the few minutes during which the enemy would be under fire we should have to get in as many rounds as possible.

With our present slow-moving towed targets, the variations of range are usually so slight that predicting becomes rather a farce, as even after making a prediction of only twenty-five yards the G.G.C. often finds that his range does not alter, and after some delay he receives "Range stationary," when he probably alters his elevation and in this manner a lot of time is wasted.

What more often happens is that the B.C. gets a range put on the dial and signals "Range stationary," lets the G.G.C. fire off his gun, and if the range has altered he orders the dial reading to be changed, again signals "Range stationary," and so on. In this manner it is possible to get the guns fired without delay and with fair accuracy, but it virtually becomes firing at a stationary target, in a manner which, for the purpose of training the G.G.C. and detachments for the requirements of active service, is as good as useless.

This slight change of range is bound to occur, if the target is towed over such a course as that described in "Instructions for Practice," as it then practically during the greater part of its travel moves round the arc of a circle of which the battery is the centre ; it would be far better to give it a straight run at 45° to the line of fire, turn as short as possible away from the battery, and run back across the front, describing a figure 8 course.

Besides the disadvantages already mentioned, the use of towed targets limits our range to 3,000 yards, except in special cases when guns are mounted 400 feet above the sea ; the length of the run being consequently short we get no practice in ranging under true service conditions, when fire would probably open at 5,000 yards or more.

What we really require is a light fast-moving target, capable of motion towards or from the guns direct or at any angle, with screens at right angles to each other, so that the target may be visible in any position, and a framework of light steel or other metal offering little surface to damage by projectiles.

Such an ideal target, would of course have to be self propelled, or connected by a wire to a drum on shore or on a tug.

The nearest approach we have as yet got to this is the "Osborne," but the present pattern, capable of moving eighteen to twenty knots, is too small to be suitable for practice except from Q.F. guns. There is no reason however why a larger one should not be made for ordinary practice. Motion being imparted by winding in a wire on a drum, any speed necessary could be given, and by using a lead block attached to a buoy, the target could be made to travel at any angle to the line of fire.

A self propelled target, which in these days of automotors is sure to make its appearance before long, could be set to represent any form of attack, but at present the cost would probably be considered too great, although the outlay would be amply repaid by the increased efficiency of all concerned, by saving the value of a large number of record targets which get destroyed annually, by the rounds fired being really instructive, and by the nearer approach to service conditions of the practice.

Ammunition.

The next important item is that of ammunition allowed and employed. The latest regulations on the subject should very much simplify matters and improve our "combined practice." By the blending of small batches of powder, we have got rid of what was at one time a fruitful source of irregular shooting, and may gradually do away with all small groups in magazines.

The cartridges on armament charge, should however be managed so that every gun of a group may be able to fire *at least* ten rounds of the same batch, though twenty would be a better minimum. In all cases where less than this are required for the year's practice, and there are no small batches remaining, they should be made up locally; but whenever possible, the armament cartridges should be used up, and replaced by others of later date, to prevent the accumulation of old powder. A little combination between officers demanding ammunition, should make it simple, in most cases, to fire ten or twenty rounds per gun from one or several groups during the year.

Instead of having a fixed number of rounds allowed, and commuting as necessary, each station can now receive the money value, which can be expended as most convenient. The proportion of this allowed to companies, is the equivalent of 140 rounds of 64-pr. R.M.L., which in some cases gives a number of rounds quite inadequate for proper company training.

Each company should receive a more liberal money allowance to cover blank ammunition, elementary, company and competitive practice, according to the station it is to fire from and the guns it will have to use. The value of a round of every description of ammunition being assessed, the C.O. could decide upon his programme of practice; allowing for the rounds required for competitive, he could base his demand upon the scheme he wishes to carry out, and expend his balance upon 64-pr. for elementary and blank.

Reports and returns.

One great drawback to the successful carrying out of practice, is due to the innumerable reports and returns that have to be made out afterwards. This evil cannot be made clearer than by quoting words used in one of the commended essays, 1895 :—"we must remember that the most careful notes are needed to be taken, moment by moment, if full value is to be got out of the ammunition expended."

What is the consequence of this taking of notes? The B.C., who has more than enough to think of, often is further worried by having to write notes, or seeing that they are properly taken by others; the G.G.C. perhaps has to write down the range he fired at, the reading of the dial, the deflection, etc., when he should be thinking of his next prediction; and the gun captain, instead of superintending the sponging out of his gun, is marking the recoil with a piece of chalk!

All these details, though they do not sound formidable, are really most irritating and lead to errors. Our practice should be for the purpose of training men to service conditions, and should *not* take the form of a series of experiments; although at station practice when guns may have to be fired for the special purpose of testing mountings, notes sometimes become necessary.

Range and deflection corrections.

We have made such a rapid transition from the old days, with practically no correction but what the No. 1 thought right, to our present system that we have almost run the subject of ranging to death. In the range given to the guns, we may have corrections for powder, travel of target, time of firing and flight, wind, tide, displacement, level of

racers, and possibly for error of instrument; in deflection we have to allow for wind, travel, time of firing and flight, besides possibly wishing to hit a certain part of the objective, and in certain cases having to get concentrated fire.

The difference of level of racers and errors of instruments should not exist, and wind is generally not sufficient to affect the shooting very much. As regards the other items, when using P.F. case III. most of these disappear automatically or are allowed for by the operators, with the exception of training for concentrating fire, which is ordered by the G.G.C.; with P.F. case II. the corrections for range are made at the instruments and line only has to be thought of in the battery. This latter is generally looked upon as the most satisfactory method of conducting fire, as it leaves the B.C. a free hand to attend to his many duties, while giving him complete control over his guns.

Use of D.R.F.

In many cases however, groups have to be fought by D.R.F., and even when P.F. is installed all should be prepared to work with D.R.F.'s as an alternative, and the best method of using these instruments requires consideration.

With D.R.F. we cannot avoid displacement, except by placing the instruments close to or behind the guns, when the smoke is liable to interfere with their proper working. The differences due to displacement are allowed for by the G.G.C., but the remaining corrections at present fall upon the B.C. unless he arranges otherwise.

Col. Jocelyn, in his lecture on "Coast Artillery in Action," in November, 1894, stated :—"We have got to divorce ourselves from the idea that rules applicable to target practice are any good on service."

Alas! as matters stand at present these words are only too true in many cases!

But is there really any necessity for this? Cannot we bring things down to the level they would assume in war time?

If it is to be done, we must commence by simplifying our system of giving corrections with D.R.F.

Few officers in peace practice are equal to the task of applying the many corrections, and fewer still could in action, calmly time the rate of travel of a ship, and the number of degrees it moves through in one minute, calculate these corrections, add or deduct others, and order the dial to be set in the manner shown in Sec. III., Part III., G.A. drill, at the same time attending to the many other duties which will devolve upon them, such as communicating with the F.C., identifying and pointing out targets, ordering rate of fire, etc., etc.

Many officers prefer to ignore all drums etc., entirely, and use their own common sense and practical experience, with the result that their shooting is generally far more effective than that of others, who muddle their heads by trying to calculate their corrections to too great a nicety, and undoubtedly on service they would adopt the simplest method.

Would it not be far better to at once abandon very minute corrections, and lump them all into one general estimate for the first round, and then correct according to the shooting of the guns, bracketing the target to guard against wrong observation?

It is rarely, at practice, that a B.C. has more than one or two groups firing at the same time, and the guns are usually of the same nature; but let us take a case, which under present circumstances might often occur in action, and suppose three or more groups, guns of different natures, the corrections for one group not suitable for another, owing to

difference of powder, and one D.R.F. only available. A moments thought as to what would have to be done under these conditions, shows how impossible it would be for the B.C. to see to minute corrections of range, besides his more important duties of supervising his command, even supposing it possible for him to carry on at all with the one instrument, which is more than doubtful, as he would have to employ several dials, each with a different reading.

In drill this difficulty is not brought home to us, and as an illustration, one might quote the manning of a certain fort on the south coast which took place not very long ago. They had one D.R.F. only, and ranges had to be passed to four groups of 9″ R.M.L., two of 10″ R.M.L., and one of 64 prs. Of course all went very smoothly and everyone was very pleased ; but what would have happened at practice supposing 100 yards difference in shooting between some of the groups ?

It would certainly be far better to have one D.R.F. to every group, and let each correct independently, at all events if the groups are not of the same nature of gun.

If an observer can be trusted to correct with P.F., surely he could be trained equally well to correct with D.R.F., especially now that a reliable instrument has been introduced. In this manner we would greatly assimilate the different methods of working a group, more nearly represent service conditions, and any officer with a very little training could become an efficient B.C., who could direct and observe his fire from several groups at the same time, and would really have just as much control over his observers as if he were in the D.R.F. emplacement.

The system adopted for P.F. instruments can very well be followed by D.R.F.'s.

The B.C. gives the approximate correction for each group, allowing for powder and travel ; the allowance to give for powder can only be judged by its age, unless a trial shot can be fired at a known range ; that for travel can be judged quite near enough, especially if the B.C. has had a little practice at drill in noting the movements of vessels and comparing them with drum corrections. For the purpose of training the B.C. to make a correct estimate, tables of some form or other are invaluable, *at drill.*

The first shot being fired, the drum reader notes the range and the observer runs on to the splash ; the reading is taken, and the difference should be the amount over or short ; the drum reader calls out, say, "Correct for 50 over," when the dial number makes the necessary correction.

If clock dials are used the dial number must keep a note of the various corrections, and see that his dial is reading so much more or less than the range called out by the drum reader. For example : B.C.'s correction for powder, travel, etc. ... ... + 150

Correct for 50 over... ... — 50

+ 100

Range-indicators.

For service conditions the clock dial is not a very good adjunct, for, to be clearly visible, it has generally to be placed in a conspicuous position, where it might become exposed to the enemy's fire ; it is often impossible to see it owing to smoke ; mistakes are apt to occur in reading it if at any distance, and at night it is difficult to illuminate ; but the greatest disadvantage of all is that the G.G.C. has to more or less

keep his eyes glued to it, and consequently cannot attend to his guns as well as he otherwise might.

Electric range-dials.

A far better arrangement is the electric range dial. It is very simple and any intelligent gunner can be taught its working, connections, etc., in a week ; by its use the drill of a group becomes practically the same as when using P.F. case II., and the learning of drill details is consequently simplified, which to Militia and Volunteer officers and men would be a great advantage ; the G.G.C. can attend entirely to the working of his guns, and at the same time hear his ranges called out by the dial number, as do also the G.C.'s and G.L.'s. The system of making corrections at the D.R.F. also becomes simplified and similar to using P.F. case II., the dial number at the instrument merely having to cut off his current, run back or forward according to the number of yards the shot was short or over, connect again and move to the range called out by the drum reader.

This system has been tried and found to work very smoothly and well, the D.R.F. detachments very soon get into the way of making corrections rapidly and without mistakes, and the only objection to these dials is their liability to "slip," but it should not be difficult to remedy this.

One thing that has to be guarded against, is the tendency men have to correct for every few yards' error and trying to get extreme accuracy. They should be trained to rarely correct for anything less than twenty-five yards short or fifty yards over, which will be quite near enough for all ordinary service conditions, though of course at competitive practice, when firing at record target, greater accuracy may be required ; they should however be made to correct sufficiently to get a "bracket," as at least one in four rounds should be short of the target.

G.G.C.'s corrections.

As regards the G.G.C.'s corrections, that for displacement is of great importance. If the D.R.F. emplacements are near the groups or behind them, matters are much simplified, but if some distance away, the divisions marked on the arcs are too close together, and if the target is at all a rapidly moving one, correct prediction becomes a matter of great difficulty.

It would be a good plan if the G.G.C.'s were to mark the displacements in chalk according to the form of attack expected. In the case of a rapid target, corrections of fifty yards should generally be quite near enough for accuracy, and would much simplify predicting ; with a slow target or when great accuracy is necessary, divisions of twenty-five yards must be used.

Deflection corrections.

The deflection given to guns is usually ordered by the B.C., but he is often so far to a flank, that he cannot judge line very well. A plan sometimes adopted is to have a group observer to note the number of feet in front or behind the target the shot strikes ; this can be easily estimated if the length of the target is known. The G.G.C. corrects his own deflection roughly ; for example, at a mean range of 2,000 yards, ten feet might be taken as requiring five minutes with R.M.L. guns.

The advantage of thus correcting is that it leaves the B.C. free to see to other things, and that the G.G.C. need not correct if he observes a delay in firing his gun, or thinks, from the movements of the layer, that the line is not reliable ; the B.C. on the other hand, judging only by what he sees, may correct on a badly layed round and thus throw out the whole of his shooting.

SUGGESTED SYSTEM OF PRACTICE.

Nature of practice.

The various natures of practice at present consist of the following :— elementary, company or service, competitive, regimental and station.

The first three, classed as "company practice," are chiefly intended for the instruction of a company as a unit. The other two are for the purpose of testing the working of the higher commands, communications, ammunition supply, etc., and to ensure the efficiency of guns and mountings by firing them occasionally ; they should always take place in combination with one another, upon the same day, and come under the head of "combined practice."

Every company should be struck off duty for a week, if possible immediately after their annual course, for "company practice." To make this really interesting and instructive, and in order to have conditions as nearly representing service as possible, it is necessary that every man in the company, who would have to take his place in the works in action, should do so at practice.

Under present circumstances, in many cases this becomes practically an impossibility ; there is all the routine work of barracks to be carried on ; men employed in various ways often are not relieved, as it is considered that there are sufficient to man the guns without them, and that just for a day or two of practice, it is not worth while taking them away from their employment. In this manner, at certain stations, a good number of men may be several years without seeing a shot fired.

All employed men should be relieved for the week, and no duties whatever such as guards, etc., be required of the others. To ensure this all the more, companies should, if possible, carry out their "company practice" at one of the schools of instruction or at a "practice station."

Practice stations.

There are many places at home where it is excessively difficult to practice at all, owing to the amount of shipping about and the consequent constant interruption of fire, which entirely prevents any chance of representing service conditions ; the ranging is greatly handicapped ; the men are kept waiting about for hours, and everyone gets annoyed with the whole work, and only too glad to fire off a stray round now and then and go home.

At such a station as Sheerness, in certain states of the tide, it becomes hopeless even attempting practice, and at others, Plymouth for instance, the conditions are almost as bad. On the other hand there are stations where firing can be carried on almost without interruption. A certain number of these should be selected as "practice stations," not necessarily being schools of instruction, and at least every other year all companies should carry out their "company practice" at one of them.

For some years past the Portsmouth companies have practised from the Isle of Wight forts, and all reports seem to agree as to the great gain in fire discipline, etc., of all concerned. The same thing has been tried by sending a company from Dover to Newhaven. and proved a great success. The men are all the better for a week in camp, and thoroughly appreciate having no fatigues to find ; they get very keen about their drill and work, and feel that their time has been really well spent ; the officers have a chance of getting their men in hand, and know that they can make plans for drill and practice without the probability of having them all upset at the last moment.

Objectives in war time.

In all practice a marked difference must be made according to the form of attack represented and the means employed to meet it.

We may leave raids by torpedo boats, etc., to be dealt with entirely by Q.F. guns, which are now provided, or being provided, at all places liable to be so attacked.

The unprotected cruisers would scarcely be foolish enough to ever venture within range of coast forts, and we are thus left only armoured cruisers and battleships to deal with. These will either engage the forts or attempt to run past them, and may be attacked by common shell fired at the unprotected parts and superstructure, by armour-piercing shot at the belt, or by high-angle fire at the decks.

"Deck attack" will only take place in exceptional cases, at long range, when the guns would be fought by P.F. case III.

"Belt attack" would be used if we wished to hit the ship in a vital spot and were certain of repeated penetration; the target to be hit would then only stand a few feet out of water, and the greatest accuracy would be required both in elevation and deflection, rapidity of fire being sacrificed. At practice, when representing this case, minute corrections will be necessary, and if the target is running past, firing must take place at fixed points in the channel as described in Section XVII., Part VI., G.A. Drill.

In the great majority of instances we would however use "shell attack," when our object would be to pour in an overwhelming fire, to silence the ship's guns if she is engaging the forts, or if attempting to run past to so cripple her by destroying her conning tower, steering gear, communications and lighter armament, that, even if successful in her object of passing the forts, she may not be in a position to do much damage.

The majority of foreign cruisers and battleships have a high freeboard and a good deal of top hamper; the barbette guns, the conning tower, most of the Q.F. guns and the search lights are all well above water; the fore barbette gun of the "Charles Martel," to take a single example, has a command of twenty-nine feet. The greater part above the belt is open to shell attack, so that we get a target from twenty to thirty feet in height to fire at.

A 9″ R.M.L. gun, at a height of 100 feet, firing at a ship broadside on, having superstructure to 20 feet above water, would probably hit with any shot not more than 50 yards short of or 80 yards over the line of keel, and if the target stood 30 feet, the margin would be 70 yards short and 120 yards over. With a 9·2″ B.L. the figures would be—80 and + 140 in the first case,—120 and + 220 in the latter, approximately. A ship not full broadside on would allow of an even greater error in elevation.

We see from these figures that there is a good margin for inaccuracy, and that we can devote our attention almost entirely to rapidity of fire; deflection also is not of extreme importance, as it would take very bad laying for line, to miss a warship steaming past.

At practice then, we should limit our corrections for elevation to twenty-five yards short and fifty yards over, except in very special cases; "fresh lay" should rarely have to be given, and every shot should be made to strike the water a reasonable distance astern of the point aimed at. There would be no excuse in action, for a shot falling in front of the bows, and for this reason the use of a double Hong Kong target is excellent, as training is given in judging the amount of deflection necessary, and we get a nearer approach to service conditions.

From the foregoing remarks, we see how important it is that a

distinction should be made in the method of conducting fire, in accordance with the scheme represented, and that hitting a small target should not always be the height of our ambition !

Company practice.

Let us now decide how best to ensure proper training in accordance with these ideas, and suppose that a company has been sent to its "practice station" or has been struck off all duties for a week, and that, if it is to use guns of a different nature to those it has had to do with, an extra day or two has been allowed to learn the single gun drill and study the communications.

Elementary.

The C.O. would commence by manning a group of light guns, if possible 64 prs., the gun detachments being formed chiefly of the younger soldiers, and practice at a stationary target or slowly drifting one.

In action it may often happen that the instruments get destroyed or communications interrupted, when the direction of fire would probably get out of the hands of the B.C. and his range finders, and into those of the G.G.C.'s, and the system employed for ranging would be the "bracket."

To prepare the younger officers for such duty, and to give them confidence, this elementary practice should be left entirely in their hands ; they should be allowed to make such arrangements for observation of fire as could be carried out at a minute or two's notice. To fulfil these conditions, the most they could probably do would be to send an observer a few hundred yards to a flank, who would signal unders and overs by any pre-arranged method. The C.O. should leave the G.G.C. absolutely free to do as he likes, and only interfere if he sees any very glaring mistake or anything likely to lead to waste of ammunition, and at the end should criticise all errors in the presence of the whole group details.

This practice would be extremely beneficial to all concerned, but especially to G.G.C.'s, for it would teach them to think for themselves, and give them some idea of what they can do or still have to learn.

What a lot of responsibility a G.G.C. would have if actually in action ! Yet he very rarely gets a chance of firing a series himself, and too often only has a very superficial knowledge of what the B.C. has been doing; his ideas of fire correction and direction are formed from drill conditions, which convey only a very poor conception of the difficulties met with in actual practice.

Blank.

The next item in the week's work should consist, if possible, in manning several groups under service conditions, the laying being at a target moving as rapidly as possible towards and from the battery, and representing the various forms of attack possible in the case of the works manned. Blank ammunition or friction tubes should be used, and the imaginary amount over or under, of each shot, should be communicated by the B.C. or other officer deputed for the purpose, to the range-finding operators. P.F. case II. might first be employed and a change made to case III. or D.R.F., and great attention should be given to the training requisite to pass smoothly from one system to the other.

This work would get everyone into their places, test communications, give practice to P.F. or D.R.F. operators, and ensure everything being in proper order for the firing to be carried out next day.

The battery should be similarly manned at night and blank ammunition fired, everything being under service conditions, strict silence enforced, and particular care taken to screen all lights. The electric search lights should be in use and directed by the B.C. if necessary,

the most rapid fire possible being kept up while the target is visible, but careful laying, etc., must be insisted upon, as at night the layers are apt to shirk this and the tendency is to go in chiefly for "show."

The importance of firing with blank is not sufficiently recognised, and usually no provision is made for it. It is however a most excellent method of improving the training of the personnel and giving the finishing touch to the drill before commencing practice, and excepting one or two minor details such as projectiles not being rammed home, and the guns sometimes having to be run back, the work done is almost the same as at actual practice, with the great advantage that there are no restrictions to firing on account of danger to shipping, etc, and that therefore service conditions can be more nearly represented, the target can approach or recede at any angle and fire can be opened at any range.

Practice with blank is the only way in which we can train men to night work, is comparatively inexpensive, and teaches all concerned, except perhaps the B.C. and his observers, almost as much as practice with projectiles. To be truly instructive however, careful checking of the elevation ordered and given, is necessary.

Service. Service practice could now be commenced, a scheme being drawn out and published in orders, and not merely inserted in the practice report to satisfy certain regulations.

As the object should be to train all hands to meet any form of attack likely to take place, ships running past, steaming about at medium range, anchored or disabled, should, if possible, be represented on different occasions. Whenever a moving target is used, a stationary one should be previously laid out, so that in the event of the former getting destroyed, or if desirable for any other reason, the fire of the guns may be turned on to it as rapidly as possible. This would give excellent training in directing fire, often save a lot of waiting about while a new target is procured, and represent a possible occurrence in war time, such as a ship becoming partially disabled, an overwhelming fire being poured into her while in that state.

At least two or more groups should be used, each having its own P.F. or D.R.F. If the amount of ammunition available is not sufficient for this, one or more of the groups should fire with blank or friction tubes, but in all cases the complete battery command should be manned if there are sufficient men, so that all may get into the way of working together, and the B.C. gain experience in directing the order and rate of fire, etc., of his groups.

When using D.R.F.'s, a B.C. could, in action, rarely be near his instruments and make his corrections; at most he could only do so for groups of one nature of gun, worked by one D.R.F. It would then be far better to get his operators into the way of correcting for themselves, under the supervision of the R.G.C., he himself keeping a general hold on them at first by employing "slow fire," ordering corrections only if he finds them going wrong.

Supposing the target to represent a ship moving rapidly or trying to run past, and attacked with common shell, everything should be simplified as much as possible; there should be no attempt at minute corrections, B.C.'s drums should be laid aside, the G.G.C.'s should not give displacement corrections at closer differences than fifty, if the range varies at all quickly; fire should be as rapid as possible consistent with fair accuracy, and casualties of all kinds should be rehearsed, such as B.C. being placed out of action, the senior G.G.C. taking his place,

being himself replaced by a G.C., and so on down the chain of command. If possible, there should be reserve gun layers to take the place of any at the guns, for in action these would be the most exposed men, and more liable to casualties than anyone else. The target employed should be a light one or double Hong Kong, advancing as rapidly as possible and at as great an angle as is consistent with safety, so that the ranges may vary quickly. Careful observation of the rounds should be made from the tug, for which purpose a reliable instrument should be provided ; something in the form of two arms with straight edge sights, standing upon a tripod, and set to the length of the tow line, so arranged that if one were kept on the target and the other turned on to the splash, the included angle would show the yards over or short on an arc scale, would probably meet our requirements.

After each days practice, the B.C. should let all concerned know the result of the firing, criticise any mistakes made, and point out the probable effect on the enemy's ship. By doing this, the detachments will take a far keener interest in their work than if they are merely employed to load and fire the guns, without knowing the object represented or the result obtained.

Competitive.

The last item in the week's programme should be the "competitive," and a marked difference ought to be made between this and the previous practice which, as before stated, should be chiefly for the purpose of training all concerned in "fire discipline." "Competitive" should be the test for accuracy, consistent of course with fairly rapid fire.

The target being probably a record one, no very great and rapid variations of range need be anticipated and the dials would read to 25's. The B.C. should himself be at his D.R.F., if it is used, and correct his fire. The powder should if possible be of same date as that used previously, so that its shooting error may be known. The groups should be selected, having guns of the same nature, so that the corrections may be suitable to all. The B.C. would have time to calculate his range and deflection for the first round, and should carry out all future corrections himself. He might, if he prefers, depute the line correction to his G.G.C.'s, for reasons previously stated.

The G.G.C.'s should make accurate corrections for displacement, the arcs being marked in 25's, and the firing must be fairly deliberate, the target being taken to represent a ship steaming about slowly and bombarding the forts at medium range, and the object to hit her in a particular vulnerable spot with armour-piercing shot.

The custom of firing a series the day before, exactly similar to the competitive, is greatly to be deprecated. A company has little enough ammunition under the most favourable circumstances, and if thirty-two rounds are swallowed up by ante-competitive and competitive series, there is very little left for firing at a rapidly-moving target, which is really what our attention should be chiefly devoted to.

Combined practice.

One day or more in the year should be given up to "combined practice," the time being chosen according to circumstances, but if possible after the companies have completed their firing and returned from practice camps or schools of instruction. If the Militia are out for training or the Volunteers available, a certain number of works, which would be allotted to them on mobilisation, should be manned by these forces. In every case an attempt should be made to have all ranks working in the places they would occupy in time of war.

Before the day appointed for practice the whole of the works should

be manned, both by day and night, at all events so far as executive officers, gun captains and layers, range-finding detachments and communications are concerned. It is most important that everyone should thoroughly understand what they will have to do in order to avoid unnecessary delay and the practice becoming a farce.

The whole of the ammunition available should be so distributed, as to ensure every group having an approximately equal number of rounds to fire, and groups unable to use projectiles should have blank.

On the day that "combined practice" is carried out, every man should be taken from employment, and only those absolutely necessary to find guards, cooks' mates, and one or two other special details, allowed off parade.

The battery commands should assemble on their "manning parades," and be marched to the works in time to open fire at the hour ordered; everything should represent service conditions, and no one should be exposed or stand in positions they could not remain in under fire, with the exception of those detailed to communicate with the tug if a towed target is used; all arrangements for replacing casualties or breaks down in communications should be made; the B.C. should go to his command post and leave the correction of fire to those who would have to do it in action.

If the general idea, notified to all concerned, is to stop ships running past, a marked difference should be made according to whether shell or belt attack is ordered.

Before signalling to the tug to start, it should be ascertained that the range will be clear for at least fifteen minutes. The target should travel at full speed, commencing some distance away from the outermost battery to give time for the instruments to pick it up, and for the F.C. and B.C.'s to issue their orders as they would in action; it should run straight through the defences, and each group should open upon it as it comes into their arc of fire, provided the tug is not within the dangerous zone. If possible to start two or more targets at an interval, the practice will be more realistic and give better training in discipline and direction of fire.

Rapidity should be essential, unless the F.C. orders belt attack, in which case the guns would probably have to be fired only at fixed points in the channel.

If a bombardment is represented, two or more targets might be employed circling in front of the forts, the F.C. telling off certain batteries to each target or concentrating his fire, according to circumstances. His orders should mention what class of ship is engaged and the form of attack to be used.

The targets should describe such a course as will ensure the ranges changing rapidly; we cannot unfortunately fire when they are moving end on, and thus fail in getting practice in this most important case. If we can only get a self propelled target, the experience gained will be very great, as it could be set to describe a circular course, and the groups could fire at it in every position; as the corrections necessary would be a constantly varying factor, those concerned would learn to correct according to the shooting, and not trust to any theoretical calculations. Such an ideal is still, alas, only a dream of the future, though let us hope, the near future!

Q.F. GUN PRACTICE.

Undoubtedly in the next war, the form of attack we shall have to be chiefly prepared for, will be sudden raids by torpedo boats and destroyers, and as Q.F. guns only can be used with effect against these, no trouble should be spared to get all who will have to use them thoroughly trained.

We now, at last, have something definite laid down in the drill book as to the method of fighting Q.F. guns, so nothing more need be said about laying, ranging, etc., when using the ordinary sights; but the introduction of the automatic sight, which is now an almost accomplished fact, will greatly simplify matters, and every gun will be able to deliver a really effective fire on any target pointed out. Fire direction will be simple, but the G.G.C. may have to order the sights to be set for height of tide, and estimate corrections for the travel of target during time of flight.

If the guns are to be served in a really efficient manner, constant practice is necessary, as, unlike heavy guns, drill is very little use.

In every company, one of the subalterns should be selected as specially in charge of Q.F. guns and detachments, and the N.C.O.'s and men should be the very best; in fact, all should look upon their being chosen for Q.F. guns as an honour. The subaltern selected should have the drilling of his detachments and carry out practice with them.

Firing with tubes, at a moving target, should be employed to train the layers before practice with shell is attempted. This latter should take place during the week of "company practice" or immediately before or after "combined practice," each company in the station being allowed a proportion of the rounds provided.

It is essential that the target should be a very rapid moving one. The "Osborne" is most excellent in this respect, a speed of eighteen knots being easily obtained, and the spray thrown up gives a very good representation of the bows of a torpedo boat travelling rapidly. Arrangements as at Shoeburyness, where the wire is wound in by a drum made to rotate by machinery, could only be employed in very few stations owing to cost of plant and the danger of the wire fouling shipping; but by having the line wound in on board a tug by a winch or donkey engine we could multiply the rate of travel, and thus obtain almost any speed required without elaborate machinery and at small cost.

Firing at a Brennan torpedo has been carried out as an experiment with success, but if allowed for ordinary practice something more visible than the small flag usually employed to indicate the position will have to be attached above water.

It must not be forgotten that, in many instances, torpedo boats will be temporarily disabled or checked in front of the booms, and firing with Q.F. guns at a stationary target must therefore occasionally take place.

At "combined practice," if there is sufficient ammunition, Q.F. guns might sometimes be employed in the defence according to the scheme adopted, as besides their use against torpedo boats, they will prove invaluable in keeping down fire from the upper structures of ships within their range.

MILITIA AND VOLUNTEER ARTILLERY.

A great part of our home coast guns would be manned in war time

by auxiliaries, and if we expect them to do good work, they must be allowed sufficient ammunition to fire a fair number of rounds under service conditions, and their practice must be carried out from the works they will have to defend.

The Militia are in a much better position to do this than the Volunteers, and now that they are brought for their training to mobilisation stations, as often as possible, a great improvement may be looked for in their efficiency as Coast Artillerymen. The officers are however the great difficulty, as owing to the lack of ammunition they acquire but little practical instruction in the many details of fighting guns ; for this reason Militia officers, more especially those of higher rank, should whenever possible be attached to Regulars for the purpose of watching or taking part in their practice.

The suggestions for carrying out "company practice" should apply also to Militia during their training, and some responsible R.A. officer should always be present and ensure service conditions being adhered to. This is still more necessary in the case of Volunteers, where the tendency is often to sacrifice everything to extreme accuracy, and one sometimes sees the G.G.C. and even the B.C. himself checking the laying ; when after a good deal of delay the gun is fired and possibly hits a standing target, all think they have done well ; but three rounds fired in the same time, even though twenty-five to fifty yards over, should be a much better object to achieve.

The question of Volunteer Artillery is receiving a good deal of attention, but yet not nearly as much as it should, for there is no denying that there is great room for improvement, and that with modern guns and the present system of coast defence, a far greater efficiency is required to make this branch of the service, upon which so much may one day depend, thoroughly useful. The men as a whole are excellent, and we may take it that a few days' regular drill in their fighting positions would ensure the proper service of the guns ; but the officers are very often woefully behind the times, not through any lack of keenness on their part, but for want of opportunity of bettering themselves, and obtaining the knowledge required to make a good G.G.C. or B.C., which can only be obtained by taking part in practice from properly manned coast defences.

Whenever possible therefore Volunteers should be brought out for a week, and camp in or near the works allotted to them ; they should be given a liberal amount of ammunition, and after two or three days devoted to drill should practice at a moving target, the details for instruments and communications being supplied from the district staff, and a good R.A. officer acting as F.C. Rapidity of fire should be insisted on at all times, and the layers made to understand that practice is not being carried out for their own special edification, and will be judged not by individual laying but by the general result obtained.

The large amount of firing with 64 pr. at standing target which takes place annually should be discouraged, as although no doubt good in its way it does not represent service conditions, and there is more to be learnt by firing one round per gun from a group of 9″ R.M.L. at a moving target, than fifty rounds of 64 pr. at a standing target.

Every opportunity should be taken of getting auxiliary Artillery to join in "combined practice" as before suggested, and if every three years the defences could be manned in accordance with the mobilisation tables a great deal could be learnt, and the three branches—Regulars,

Militia and Volunteers—would be brought into much closer touch, and understanding one another would be ready to give a good account of themselves should the necessity ever arise in time of war.

Money is the one great stumbling block to increased efficiency, but considering the cost and value of the works erected, in few ways could money be better spent than in improving the personnel of our Coast Artillery, so that they may be capable of using them effectually.

THE CHOICE, OCCUPATION AND CHANGE OF POSITIONS BY FIELD ARTILLERY.

BY

MAJOR E. S. MAY, R.H.A.

(A Lecture delivered to the School of Gunnery at Shoeburyness on the 9th of April, 1897).

COLONEL R. M'G. STEWART, C.B., A.-D.-C., IN THE CHAIR.

COLONEL STEWART AND GENTLEMEN—A few words on a question which, just at this moment, is attracting much attention may not come amiss from one who has devoted some time to its consideration, even if that may be the only warrant for the intrusion of his views upon you. Not only has the matter of positions provoked an unusual amount of discussion of late at our exercises and manœuvres, but we have recently seen opinions and recommendations and criticisms published in our "Proceedings," which, while they testify to a widespread and keen interest in tactical problems, manifest also, if I may say so without presumption, the existence of misconceptions due perhaps to inadequate consideration of practical difficulties. Until these latter have been personally experienced, they are not infrequently passed over with too little notice. One officer in particular, who twenty years ago conferred a great benefit on the Regiment when he translated "Von Schell" for its use, has written about a method of bringing guns into action in Germany, which he warmly advocates, and I feel sure we will all study what he has said with that attention which everything that falls from his pen is entitled to receive. The method he describes is based on an unlimbering considerably behind a crest line and running the guns on by hand until they can just see their objective over the top. I shall speak of it now as the "creeping" system, not in any spirit of sarcasm, but simply to define it from the other methods which we have already terms to identify. Another writer has devoted many pages to the discussion of almost all possible positions and methods of occupying them, and yet perhaps has scarcely provided us with conclusions which are completely satisfying.

You have all, I am sure, heard of or read these articles here and, I

presume, are acquainted with the two normal methods of occupying positions which our Field Artillery use and with "Field Artillery Drill, 1896," page 12, which tells you what you should look to when choosing your ground. That is to say, put briefly—

A clear view of your target, and ground you may want to cover. A good platform for your guns, and no obstacle to movement. As many difficulties towards approaching you, and as few facilities towards ranging on you, as possible. Lastly, cover, natural for choice.

The book does not tell you how all these requirements are to be provided for in practice, nor shall I attempt the task. A legal text-book may give you principles and precedents, but it cannot put a convincing argument into your mouth. That must depend on how discreet and opportune you are in utilising your knowledge. So also in judging how you may best elude observation in the field and at the same time perform your duty fully, you must be guided by the tactical situation, the lie of the ground, the light, the background, the state of the soil, and the condition of your men and horses. That is why the drill-book does not attempt to discuss the forward slope, the background, and some other points of which it does not intend, I presume, that officers should lose sight. Personally, I think also that it is best not to burthen a man's memory with more theory than can be avoided, but to leave a good deal to his own judgment.

I think both writers, to whom I have alluded, take a somewhat pessimistic view of the capacity of our artillery officers. I don't think, if all the circumstances are duly considered, that there is as much divergence of opinion afloat amongst us as is sometimes assumed when a ready writer takes pen in hand. I find plenty to agree with in both papers, and I admire the industry and ability of the author of the longer one, though I mean to criticise some of his statements; but, at the same time, I am sure he will not take it amiss if I here point out that he seems to have fallen into an error to which enthusiatism is always prone and that, like Don Quixote, he couches his lance as courageously against imaginary as against real foes.

He conjures up a scene in his first three pages in which the enemy is absolutely concealed, and where the British commander "feels sure that when the last signal to advance is given, no one battery will be much behind the other in the race for the crest and for the honour of the first shot." Now I say, unhesitatingly, that this picture is misleading. I have never of late years seen or heard of a brigade division in which batteries raced into position; and, on the other hand, I have seen the most untiring patience bestowed on instructing batteries to come up together. So far indeed from officers trying to get before one another, incredible as it may sound, I believe they do their best to keep in line. But when "we look at the situation from the enemys' point of view for one moment," the distortion is more amazing still. This is what we are told goes on in our Field Artillery, and is held up as a specimen of our efficiency after all the instruction at Aldershot and Okehampton. "Colonels, adjutants, majors *and section com-*

manders often appear one after the other preceding the advance of the batteries like the peacock, the jungle fowl and the monkey, which invariably 'show up' before the tiger in a jungle beat." I assert, with confidence, that our officers do not so completely forget all the lessons of the drill-book, but in one respect the simile is most exact. If they ever did so, they would assuredly "show up" in a different way to what the writer means. It is no part of my purpose now to further dwell upon any other inconsistencies and inaccuracies which may be found in this particular article. An ill-natured critic, I daresay, could find something to scoff at, and I do not at all desire to fill that *rôle*, but neither am I content to let what is said as to artillery tactics in England go forth to the world without a protest.

I think it is a pity to commence a paper which aspires to discuss a difficult problem with inaccuracies such as these. What I think of the conclusions subsequently arrived at, must be judged from what I myself will tell you to-day. This, however, I will say at once.

Whether you go on the crest or on the forward slope or on the reverse slope, your first thought should be as to how best you may accomplish the purpose for which guns are brought into the field, namely, the destruction of the enemy.

You cannot work guns on a reverse slope where there will be much recoil.

In that case, if there be no background, go in front of the crest, but remember you must go a considerable way down the forward slope or ammunition-wagons will show up on the sky-line even if your guns do not.

You will also sometimes have to unlimber on the crest itself if front and rear slopes are both steep.

The reverse slope offers greater facilities than the forward slope because not only the supply of ammunition, but the removal of wounded men, the repair of material, the service of supply in general, the communication of orders, and the preparations for movement can all go on unperceived by the enemy.

Both the positions on the crest and reverse slopes have therefore advantages over the other one and, finally, it is not only more difficult for the enemy to range if they are occupied, but the effect his fire produces is invisible to him.

These advantages, combined with the slight additional shelter from bullets obtained, are enough to make the position on the reverse slope the one which is usually adopted, not only by our own artillery, but by the batteries of France and Germany and, I believe, of the other European powers also.

As regards what the other writer on the "creeping method" has to say, I would point out that a personal friend of mine was also in Germany last year. He tells me he accompanied four army corps in the field during manœuvres, and that he never saw the "creeping method" used at all. On the other hand, he was much struck by the precision with which positions were occupied by means of horses, after the fashion most usual here. So accurately were intervals preserved, so well was

the lie of the ground judged, that it was but rarely guns had to be moved when once unlimbered, the trails touched the ground just where they were wanted, and the detachments were free to get to work and begin shooting at once. Now I think such nicety as is here implied argues that the batteries must have practised much at that particuar system of unlimbering and that it was no very unusual procedure. That the "creeping" plan has many advocates in Germany I know, not only from what has been written about it of late in this country, but from the German papers which I often read. Indeed I gather that it is officially recommended in their regulations. What I suggest, however, is that the practice is less universal than is imagined, and that there are certain difficulties connected with it which have perhaps scarcely received sufficient attention.

I will ask you to excuse me if I refer to Aldershot. The concrete is always more interesting than the abstract, and many of you know the ground I refer to. Now those who view our work at Aldershot, as spectators, do not always appreciate the difficulties of the ground, and how much they influence and modify the course pursued. Nor do I think that in any of the recent articles the circumstances of the moment, the tactical situation, the amount of recoil there would be with service charges, or the period of the engagement have been given their due place in the discussion.

At the early stages of a fight, and in certain places, you could often "creep," and then I know many men who would do so, and in fact do. But in other positions at Aldershot you not only cannot "creep," but it will sometimes take your teams all their time to drag the guns up the slopes. You can "creep" most successfully on Cove Plateau when facing south, and batteries do then often "creep." I have seen it done and done it myself. You can "creep" on Bricksbury Hill, of which too I have personal experience, or on certain classic ground called Ball Hill, and there are other places too. But you will not "creep" up Miles Hill, not unless men are stronger than horses, nor up Long Hill from the east, nor up Sheep Hill when you engage an enemy in the direction of Bastion Hill, nor on Ravine Head when you face southwards. Again, on Miles Hill guns *must* be on the sky-line; so too must they be on part of Jubilee Hill. In short, it comes to this: batteries must get into action on these places, especially in the later stages of the fight (and it is almost always the later stage at Aldershot battles, because the ground is so small), by the means best suited to the moment and the ground, and what meets with criticism is often inevitable. But I can assure our critics that I do not believe any officer wantonly exposes his battery, and if he did so he would meet with censure at once.

In the earlier phases of a battle, if time were available and the ground were favourable, I am sure every means of concealment should be made use of. "Creep" by all means, if possible. Keep under cover and lay indirectly, make screens, observe the background, use the forward slope and act as the circumstances justify your doing. Above all endeavour to deceive the enemy and elude his observation.

But you can no more hope to tell a man what is best to do, until you stand on the ground with him, than you can tell him he is always to move his battery in a certain formation. I am only saying now what I am confident the majority of Field Artillery officers feel, and I do not believe they have any prejudice against "creeping" or any other useful expedient, at the period of the engagement I have referred to. But subsequently when you have to move in, determined to subdue the enemy's guns, or be destroyed in the attempt to do so, the conditions are widely different, and then there are objections to "creeping," which should not be lost sight of, if we are to nicely balance pros and cons.

Again, I think it is only in the case of the attack that we need discuss the matter at all. On the defensive what was done would be a matter of time and opportunity, and every conceivable means of keeping guns concealed would, and often could, be adopted.

Further, it is only as regards the position from which artillery is going to prepare the infantry attack by subduing the hostile guns that we need compare the relative advantages of "creeping," or of bringing up guns by means of horses, or perhaps of laying from behind cover.

Positions taken up previous to this phase would be merely temporary ones for reconnoitring or other purposes and at distant ranges.

Between 2500–1500 yards, however, we may anticipate that the effect of modern shrapnel will be pronounced, and the cost of exposing men or horses has to be carefully examined. Now at this stage of the fight I think it may be quite wise to "creep" if the ground be hard and smooth and the reverse slope not unduly steep. Each detachment might then run its own gun up until the target were just visible over the sights.

You could act in that way, for example, on parts of the Berkshire Downs and, if you do, the presence of your guns, until they open, will be unrevealed. That fact is quite well known at Aldershot, and on one position the old hands will even show you the exact stick to which the guns must be pushed. But the ground on the spot I have in mind is like a cricket pitch.

Consider however how infinitely more arduous the operation would be in a strange country! A commanding officer would then be in doubt as to how much or how little to go on before unlimbering. If he went too far, he might show the horses; if he were over-cautious, his men might have an altogether unnecessary strain put upon them. He would, in fact, have to take up two positions: one for unlimbering and another for the guns alone. Not only that, but the steepness of the slope or the nature and state of the soil might render the task of man-handling guns most trying. I have not seen "creeping" practically carried out in Germany, but I have just read views expressed in "The Militär-Wochenblatt" on the subject, and these difficulties are clearly by no means unrecognised there. So much so in fact that one school contends that, while you are about it, it is better to adopt the hidden

position and indirect laying altogether, and the last article I read compares these rival systems only.

I am quoting from a German article when I say that this "pulling and pushing" policy is found to be most distasteful to the soldiers, and I do not think that what we have heard of it in England has given us a complete idea of what it means. The Germans are no stronger than are we, and they find that one gun detachment alone is not able to deal with the gun. Therefore twenty men are harnessed to one gun, and half the guns are sometimes brought on by all the gunners, while the other half wait their turn. It reminds one of La Rothiére and the guns on the ridge of Trannes during the bad weather of 1814. The men pull on a sort of "prolong" (Langtau) and I will translate[1] a criticism of this means of progression just as I came across it the other day:—

"The 'prolong' used for the purpose has several disadvantages: in consequence of its great length, the foremost men who pull on it must show themselves on the crest line in order to get the gun into the proper position. Besides, it is well known that a force of draught acts with diminishing power the further it is applied from the weight to be drawn, and that twenty men pulling on one rope do not produce double the power of ten."

The writer goes on to advocate two ropes in place of one, but the point I wish to accentuate is sufficiently illustrated without my following him further, since it must be clear to all that in this "creeping" system, if the horses are less exposed, it is so at the expense of the men, while the delay and labour involved can scarcely fail to often seriously interfere with the service of the piece and the timely tactical application of the arm. In this country on the other hand we endeavour to bring as few men as possible under fire and, except for the minute and a quarter that the drivers and horses are exposed, only have six men at the most with the guns of our Field Artillery.

Let us put the two systems side by side for a moment and analyse their claims to our favour. I will first refer you to page 10 of the "Annual Report of our School of Gunnery." You will see that the two methods were tried at Okehampton last summer. The gunners who pushed the guns into position on "a gentle slope and hard ground, free from boulders and heather" (under very favourable conditions therefore), were exposed to view for one minute and fourteen seconds, while the horses and drivers which performed the same task were at a similar disadvantage for one minute and twenty seconds. The Germans, as I have shown, have found that on ground such as we would probably fight over, twenty men are needed to pull each gun into its place. The reserve of strength in horses is enough to enable them to always do the work on any reasonable ground in the same time. Therefore, if we accept the German method as correct, twenty men would often be put on three guns and then have to go back to fetch up the other three, and you would

[1] "Militär-Wochenblatt," No. 4, 1897.

therefore expose sixty men to view for two periods of one minute and fourteen seconds each or, in other words, for two minutes and twenty-eight seconds. In the other system you expose fifty-four men (eighteen drivers) and forty-two horses for a period of one minute and twenty seconds.

The chances of loss are not then so very disproportionate, but the chances of effective shooting subsequently are. For—

"The fatigue entailed in the first case was very marked, most of the detachments were quite unfit for their duties for some minutes; anything like accuracy of laying would have been quite out of the question for some time."[1]

That last paragraph should give us pause.

I do not say that on occasions "creeping" may not be desirable, but it is not surely a system to be accepted as a normal one, when the deficiencies in physique of our Field Artillery gunners is considered, and it is one certainly unsuited for those occasions when guns have to intervene quickly and decisively in the combat, unless a stretch of smooth, hard turf were by some extraordinary good fortune to be met with.

I myself four years ago held up to admiration the achievement of those German guns who massacred the three French batteries at Sedan and I cordially agree that no one but a lunatic would drive up in the open and unlimber under fire from a hostile artillery which had found the range unless dire necessity drove him on. None the less, the picture of the destruction which would *certainly* fall upon a brigade division which brought its guns "up to the crest of an intended position, in full view and under fire from a hostile line of guns," is painted in too violent contrast of light and shade altogether.

Let us analyse the situation here for a moment too. The attention of troops in action is always more or less distracted by the appearance and disappearance of hostile parties. Scouts, patrols, or stronger bodies of cavalry hover about, small parties of infantry appear, a gun opens from an unexpected direction; it is never quite the case of a cat watching a mouse-hole in a quiet corner. Except under abnormal conditions, guns appearing as is suggested will frequently not be noticed for a few seconds after their arrival. The "Annual Report of the School of Gunnery for 1896," page 10, already quoted, tells us that the horses and limbers of a brigade division "bringing its guns up to the crest line of an intended position" will be exposed to fire for not more than one minute and twenty seconds. What are the chances against them? The same report shows that the average time fourteen batteries at Okehampton last year took to commence firing "time shrapnel" was four minutes and thirty-seven seconds. And they did not arrive at what they thought was the correct length of fuze until six minutes and twenty-one seconds had passed. I see that Von Rohne[2] has put the average time that German batteries take to range (einzuschiessen) at 4·6 minutes. I

[1] *Vide* Report.
[2] "Militär-Wochenblatt," No. 4, 1897.

presume he calculated up to "time shrapnel," but it is not stated whether this was so or not. I believe our artillery is efficient and so, I am sure, is that of the Germans, but, in the face of these figures and allowing for the difficulties of a battle-field in a strange country, I do not think it is just to impute rashness to a soldier who accepted such risk as is here indicated if he wanted his guns to be of opportune service, or to call his opponent "anything but efficient," even if he did not, in the fleeting seconds at his disposal, hit a single man or horse. Many batteries at the long range, if the light be bad, never really find the short bracket at all, even at Shoeburyness, in double the times quoted and, occasionally hardly a hit would be recorded to them were the friendly ricochets off the sands eliminated. You cannot confidently rely on a range-finder, even in peace time, and even if you did, "the error of the day" has still to be discovered. Nor do I believe that to measure distances on a map in an unknown country would often be feasible. It is all very well when you know the exact spot you stand on and the hill the enemy must occupy, as is the case sometimes at our manœuvres, but without trial shots on unfamiliar ground, it will be more good luck than anything else that can give you a "target" at the first shot or two. To teach batteries that they are to fear risking their safety when there is so little on the cards against them, would be as bad as to encourage them to recklessly or needlessly expose themselves in the open where the limbers and horses would have to remain fully revealed to view. Batteries so trained would soon begin to think more of their own safety than of the general interests of the army and would meet with the contempt which was heaped on the Russian batteries at Plevna, who plumed themselves on having done their duty and retired satisfied after they had lost three per cent. of their strength, while the infantry they should have supported, suffered in some companies to the extent of sixty per cent. of their numbers.

But, when speaking of positions, I must not overlook those which are completely covered and from which indirect laying will be necessary. I believe that these will be extremely useful on occasions, but I do not believe that they will ever be used when it is possible, with a reasonable amount of cover or concealment, to lay directly. I am sure we have all seen occasions when we could have turned them to account, and certainly we should all be prepared to utilise them if need be, but there are very serious objections to them which are sometimes lost sight of by those who, in Germany especially, have taken them up with an enthusiasm which only a hobby can arouse. Theoretically, they are most fascinating, but in practice I fear would scarcely win so much admiration as they do on paper.

Their advantages are, I believe, well known to us all and are fairly obvious, but it is sometimes forgotten that it is not easy to change from one target to another when you cannot see either or when the situation is altering as it does in the course of a fight. You can very likely make excellent practice while your foe stands still, but you will not hit him at all as he keeps moving on to you, nor can you concentrate your fire as circumstances may demand.

Not only that, it takes longer to range. I will quote a few statistics I have found in the "Militär-Wochenblatt," which I mentioned just now. At some experiments quoted by Von Rohne, the well-known German authority on artillery matters, while it took batteries laying directly 4·6 minutes on an average to range on a target representing artillery, those which laid indirectly required 12·7 minutes to effect the same purpose. Moreover, when laying directly a percentage of 7·9 hits per minute was attained, against 2·7 arrived at by using the "richt-fläche." I do not attach overwhelming importance to these figures, because they are based on only five series fired indirectly; but they are probably sufficiently trustworthy to show that the two methods can scarcely be regarded as equally efficient. It is impossible, without more experience than we have had in this country, to speak with anything like confidence, but indirect laying will scarcely give good results unless it is possible for the battery commander both to observe and to command. To enable him to do this will need a very favourable terrain, and he will often have to stand on a wagon or limber in order to see. I notice that this is the view of many officers on the continent and it is with the object of helping the battery commander towards the fulfilment of his duties that the portable "observation ladder" has been introduced in some services; that of Belgium, I think, is one. I remember some years ago translating an account of one of these new-fangled adjuncts and much exercising the mind of a brother officer by doing so. He complained that of late he had been called upon to perform so many unexpected feats that he feared possibly he might some day be required to climb trees, if a hint so dangerous as my ladder was given to the authorities. I trust I shall outrage no sensitive feelings now I mention it again and that I shall arouse no animosity if I bring yet another modern contrivance to notice.

I understand that the German "richt-fläche" does not meet with favour here amongst those who have tried it practically, as I confess I have not. I do not wish to advocate the particular one in use in Germany, and I am quite prepared to believe that our aiming-posts will do all we usually require more simply and more efficiently than it can. But, nevertheless, I have myself felt the need of a "richt-fläche," and I should like to see such an instrument with our batteries. I have seen two batteries of a brigade division brought into action against a target on which they could lay directly, but the third battery had a wood in front of it, and it could not therefore see the particular part of the target on which it would have been desirable that all three batteries should direct their guns. The configuration of the ground absolutely precluded any other position being taken up. Now you cannot plant aiming-posts on the tops of trees. You could give the guns the required elevation by means of clinometers, but you could not give them the necessary direction. It is in cases of this kind that, to my mind, an instrument, by means of which guns, when they cannot see the target, may be trained in a given direction, as they are in a fort on racers, is so valuable. Everyone must also remember positions which

were just too small, owing to an obstruction such as I have indicated, and on part of which guns had therefore perhaps to be put at reduced intervals, which might have been readily and safely taken up if some aid, such as I ask, could have been called in. I commend the notion I have in mind to those of our Regiment who have mechanical talents, and I am sure, if they can invent an instrument on the lines of the "richt-fläche" they will confer an immense benefit on our Field Artillery.

But, in speaking of positions from which nothing of the enemy can be seen, the moral influence, which the uncertainty as to their situation relatively to the foe, may have on the men is a factor which must be reckoned with. Except in the very earliest phases of the battle, or under special circumstances, when natural features may render surprise or swift counter-attack an impossibility, it will be difficult for them to escape that vague distrust which always paralyses energy and vigour. They will be haunted by dark imaginings, and will perhaps think more of what may be than of what is. In the letters of "Redan Windham," just published, there is an excellent illustration of how such terror of the undetermined and unseen may cowe men who have just displayed undaunted courage. Our storming-party carried the parapet of the Redan at the last assault, but no effort, no example could urge them to cross the interior space and drive the Russians completely out of the work. They had got into their heads the idea that it had been mined, and the suspicion of the underground danger was more terrible than the actual menace in their front. And yet it was afterwards discovered that the very spot on which they hung back was directly over the magazine!

Not only, however, should we think of the immediate effect of a position in the dark, but we must weigh the consequences of teaching men to seek safety in concealment. It is to be remembered that artillery trained to keep at a safe distance of the enemy, and to drain the last drop of advantage out of its long range, has never fulfilled its *rôle* completely on the battle-field. The early portion of the American war taught us that, and in '66 the Prussian gunners, who did so much four years later, only performed their part in a comparatively feeble manner, because they were kept too much in rear. The cause of the Russian artillery failure before Plevna was also largely a lack of enterprise, as I had the honour to show at this place some few years ago. All these considerations should be pondered over by anyone who may be bitten by the possibilities, long range and improved *matériel* have placed before us. We ought all to be able to fire by indirect laying, and we will sometimes find it a most valuable aid to us. But that it can ever become the usual method of fighting guns I do not believe, and I doubt greatly whether it will ever be more than an unusual one on the battle-field.

And now, having devoted some time to the various sites where guns may stand and the manner of bringing them there, I want to say a word or two as to changes of position. I think I ought to dwell on this point, because there is a mistaken notion prevalent amongst officers of the

other arms that guns must move close in when they support an infantry assault. Men who have not had experience at practice often do not realise that the fire of a battery is almost, if not quite, as destructive at 2000 as 1200 yards, and that, under favourable conditions, it is very effective indeed up to 3000. On the other hand, artillery officers, in order to escape the criticism or censure of imperfectly informed umpires, or to avoid the reproach which attaches to lukewarm support, occasionally leave positions from which their fire is effective in order to move to others from which the chances of a slightly enhanced effect are not sufficient to compensate for the loss of time incurred while the change is being effected or for the destruction amongst men and horses which may be suffered during its progress. It occasionally comes to this, that a battery does not get credit for lending aid unless it gives visible and tangible proof of its assistance by a personal appearance on the scene. Now you must move on if the advance of your own infantry masks your fire, and therefore you will often be compelled to shift your ground, but as long as you can produce the effect required by means of shells there is no need to expose men and horses in making an advance simply to display your activity and readiness. I do not mean to say that artillery is not to be prepared "to go in," as Prince Kraft says it must, but I do mean to say that what was necessary with an artillery that relied on common shell twenty-seven years ago may not be so urgently required now when we have such vastly improved guns and ammunition at our disposal. Later on I mean to tell you something that will show that I certainly am not going to recommend over-caution, but at the same time I have too much respect for modern shrapnel to undervalue its powers. We are all almost tired now of quotations from the Franco-German war, but the German artillery then much distinguished itself and the broad features of its handling will, I believe, bear me out in what I have just put forward.

At the battle of Mars-la-Tour-Vionville, on the 16th of August, in which the Prussian artillery earned undying fame on the Rezonville Plateau, we find, according to the Prussian official account, that the Prussian batteries hardly ever changed their positions, and their mark only under special circumstances. The French artillery, on the other hand, were in constant movement.

"On their side fresh batteries were incessantly appearing, now here, now there; but only to disappear as promptly as they came and to leave to others, at other points, the continuance of the struggle." [1]

The superior accuracy of the Prussian fire may have rendered such constant manœuvring as necessary as the presence of the large French reserve of guns made it possible, but there can be no doubt that such tactics are not to be imitated and their outcome was certainly most unfortunate.

Again, in the remarks on the battles of the 14th, 16th and 18th of August round Metz, from the same source, we find the following notice of the German artillery tactics :—

"Conspicuous in the first place, in contrast to former times, is a great

[1] German official account.

change in the employment of the German artillery. Placed at the head of the marching columns, it appeared with the foremost on the battle-fields, mostly preparing the great offensive blows. Fearlessly *holding to the position which it once took up*, it may be said to have formed a solid frame-work to the order of battle, whilst the French batteries only appeared as an easily transferable force."[1]

I remember, too, the way in which some of the French batteries were handled at Beaumont. During that battle the French artillery, which crossed the heights south of Le Fays Copse, endeavoured, by repeated changes of position, to avoid the effect of the German guns, which were superior to them in every other quality but mobility, entirely futilely, however, for we find they had eventually to retire from the field. I will not enter into a more detailed account of this or other battles, nor indeed do I wish to repeat what must already be very generally known.

The experiences of the war of '70 may be briefly summed up in saying that they particularly demonstrated the decisive superiority of the German artillery, and a closer examination will convince everyone that that superiority was due to the powerful shell fire its guns were capable of, combined with the able leadership that commanded them, and not to any evolutions or manœuvring on the battle-field.

The broad features of the artillery tactics of the victors stand out clearly and unmistakably. The guns occupied a forward place on the line of march. Concentrated in masses, they took up well-selected positions early in the day and utilised the advantages they possessed in armament by remaining in them for long-continued periods and wasted no time in hasty or ill-considered movements. They could have moved just as well as the French did had it been desirable, or could they by doing so have enhanced the value of their fire. They *did* do so when it was necessary to conform to the infantry, or establish a success gained by them, but it may in general be said of their tactics that they were distinguished by the time the artillery remained in the positions selected for them.

Another feature of the German manner of fighting, as it will surely be imitated by all other nations in the future, has an important bearing on the question we are considering. Their batteries were massed together in long lines. Now it is evident that if batteries be scattered more or less singly among other troops, it may be possible to move a battery from one position to another during an engagement without the effect of the diminution of artillery fire, while it is in transit, being seriously felt. But to uproot a great mass of batteries, and by doing so to cause a cessation of fire on a large and noticeable scale, is obviously a very different affair. Such an undertaking would not be without an influence on the progress of the entire battle, and could not be entered on unless some corresponding movement on the part of the other troops demanded it.

One point more. During the final stages of an attack, should

[1] German official account.

infantry cry out for the moral support your presence will bring with it, tactical, as opposed to technical, interests must be paramount. The requirements of a good position are practically never at hand just at the right moment, exactly in the right place. You must try and get your guns where their powers may most effectively be applied, and in these last moments that will often be on ground which you would not dream of occupying were your choice less circumscribed. We have heard so much of the crest line, the forward slope and the reverse slope that it is scarcely dreamt of in the philosophy of some officers that we may have to go where there is neither crest or slope at all, on our side at any-rate. General Maurice once pointed out that in 1870 the Germans usually fired up hill. No doubt they did, but at our manœuvres, if a battery be below its antagonist, it is sometimes too readily assumed (not by artillery officers, I think, but by those of the other arms), that it must necessarily get the worst of the combat. I have spoken with a man who went through all the Franco-Prussian war and he told me that the feature of the German tactics which impressed him most was the manner in which, if the need arose, batteries were pushed on to support the infantry regardless of advantages of site. A friend of mine who lately witnessed the German manœuvres told me he noticed the same thing at the present day, and that batteries were encouraged to come into action, no matter whether they could find what we term a *good* position or not, when they were called on to come *quickly* to the assistance of the other arms. I do not mean to contradict myself, nor do I wish to advocate a revival of "bow and arrow" tactics, but I think, nevertheless, that a small hill acts too much like a magnet with us sometimes and that men will waste precious moments and go out of their way to reach one, and find themselves, when they reach it, not quite where the situation called them, because they fear the umpire's decision. At the crises I have in view it is a question of only a few batteries, and of the culmination of the fight when the foe is absorbed with the infantry. At such a moment command and background and all the other desiderata should be sacrificed to timely intervention.

Finally, let me say that I feel as if my remarks to-day savoured somewhat of negative or destructive criticism and, if so, I apologise for it. On the other hand, to enlarge on all we ought to have and all we want when considering positions, seems futile. We have so often all through to try to do the best we can under adverse circumstances that it is more confusing than anything else to insist on idealities which we can rarely or never hope to see realised. It is better that we should make up our minds that in military matters, as in most other affairs, a decision is usually the outcome of a compromise, and that in this imperfect world neither men nor positions are of a "sealed pattern."

THE GERMAN METHOD

OF

BRINGING GUNS INTO ACTION.

A REPLY.

BY

CAPTAIN J. HEADLAM, R.A.

In a lecture at the Royal Artillery Institution, last year, Captain Pilcher contrasted the German and English methods of bringing guns into action to the disadvantage of the latter. In the discussion that followed I pointed out what appeared to me to be some weak points in the German method, but the limits of such a discussion prevented any lengthened argument. I confined myself, therefore, to stating the points as shortly as possible, simply in order that such a comparison should not go forth to the public as having been made in the presence of a large meeting of artillery officers, without anything being said for our English method.

R. A. I. "Proceedings," June, 1896.

A few months later there appeared in the Institution "Proceedings" a "criticism" on Captain Pilcher's lecture by an anonymous German officer, in which my remarks were very severely handled. This criticism of my remarks was given importance by being quoted at length by Colonel Turner in his most interesting paper on "The German method of bringing guns into action."

R. A. I. "Proceedings," Jan., 1897.

R. A. I. "Proceedings," March, 1897.

Again, in the Institution "Proceedings" for April, Major Keir, has selected my unfortunate contribution to the discussion after Captain Pilcher's lecture as his text, quoting my remarks word for word before demolishing them. I feel, therefore, bound to come forward in defence.

R. A. I. "Proceedings," May, 1897

The discussion may be advantageously narrowed down to the following:—

Whether it is advisable when occupying the main artillery position:

(*a.*) To take up a position completely under cover;

(*b.*) To unlimber the guns under cover and run them up into position by hand.

(*a*) Is it Advisable, when Occupying the Main Artillery Position to take up a Position Completely Under Cover?

Unfortunately, the term "indirect fire" is used with various meanings. Such looseness of expression renders useful discussion very difficult. Field Artillery Drill defines indirect laying as follows:—

Field Artillery Drill, p. 93.

"In indirect laying the elevation is obtained by the use of a clinometer or spirit-level, instead of by laying direct on the target with tangent or telescopic sights. It may be used in the following cases:

"(i). When the target is indistinct;

"(ii). When the target, though visible from the battery, cannot be seen over the sights of some of the guns;

"(iii). When firing from behind cover."

And yet anyone reading Major Keir's paper would think that "indirect fire" and "fire from behind cover" were synonymous terms.

Against indirect laying in cases (i.) and (ii.) I have nothing to say, except that you cannot use it against a moving target, as I will show later. If the circumstances mentioned are unavoidable—as they must sometimes be—it is the best way out of the difficulty.

Against *occasional* uses of (iii.) (Fire from behind cover) I have also nothing to say. It is legislated for in our text books, practised by all batteries coming to Okehampton, and, no doubt, there will be occasions on service where such fire will be most useful. What I do maintain, however, is what I said at Captain Pilcher's lecture:—

"To the use of such practice on the battle-field I believe there to be such strong objections as to render *any general employment* of it absolutely out of the question."

My reasons I gave as the following:—

I.—It is very rare to find ground where you can carry on the practice with more than a single battery.

II. and III.—You cannot change your target or concentrate your fire without making elaborate arrangements.

IV.—You cannot fire at moving targets at all.

V.—Moral effect.

Major Keir has taken these in order. At the risk of being tedious I must attempt to do the same.

I.—It is very rare to find ground where you can carry on the practice with more than a single battery.

No doubt positions can be found easily enough when firing blank, but when the question of the shell clearing the crest of the cover has to be taken into account difficulties crop up. That this point is not attended to when firing blank is proved by the frequency with which batteries do take up such positions at Okehampton, and are only stopped from firing into the covering ground in front by the Commandant interfering. At manœuvres such positions would often be much admired.

More than this, every gunner will admit that to get any effect from

FUND.

MARCH, 1897.

iture.	£	s.	d.
.....	4	13	1
By	3	16	0
£5000	18	15	0
"	36	10	0
.....	9	2	6
.....	0	4	6
.....	0	0	0

	Royal Artillery Band. £ s. d.	Mounted Band £ s. d.	
l Cases	132 13 9	36 7 6	
s	93 11 3	27 1 0	
, &c.	36 1 8	32 4 0	
.....	1012 16 9	333 6 8	
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and Stables	9 18 11	6 1 9	
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.....	14 2 0	6 2 4	
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t March, 1897			271 10 7
TOTAL			£2283 1 2½

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ASSETS.	£	s.	d.
Sub	271	10	7
97	28	19	4
(Not i passed)	30	0	0
£			
TOTAL	£330	9	11

Colonel R.A., *President.*
etary & Treasurer

ROYAL ARTILLERY BAND FUND.

GENERAL CASH ACCOUNT FOR THE YEAR ENDED 31st MARCH, 1897.

Income.	£	s.	d.
Balance in hand on 31st March, 1896	288	13	10½
By Subscriptions received	1894	7	4
" Government Grant for 1896–7	100	0	0
TOTAL	£2283	1	2½

Expenditure.	£	s.	d.
To Postal Expenses	4	13	1
" Printing and Stationery	3	16	0
" Insurance to Michaelmas, 1897, on £5000	18	15	0
" Allowance to Clerk	36	10	0
" " Pay Sergeant	9	2	6
" Cheque Books	0	4	6
" Miscellaneous	0	0	0

	Royal Artillery Band. £ s. d.	Mounted Band £ s. d.
" Purchase of Instruments, Slings, and Cases	132 13 9	36 7 6
" Purchase of Music, Stands, and Cases	93 11 3	27 1 0
" Repair of Instruments, Stands, Cases, &c.	36 1 8	32 4 0
" Pay of Master and Musicians	1012 16 9	333 6 8
" Clothing	93 14 9	27 7 1
" Lodging Allowance	9 2 6	—
" Arranging and Copying Music	20 0 0	9 0 0
" Postage and Carriage of Instruments	2 7 4½	0 10 6
" Stationery and Printing	2 3 6	0 6 0
" Fuel and Articles for Practice Room and Stables	9 18 11	6 1 9
" Violin and other Strings	33 10 3	—
" Reeds and Drum-heads	14 2 0	6 2 4
Totals	1460 2 8½	478 6 10

	£	s.	d.
Totals	1938	9	6½
Balance in hand on 31st March, 1897	271	10	7
TOTAL	£2283	1	2½

GENERAL STATEMENT.

LIABILITIES.	£	s.	d.
Subscriptions received for 1897–8	38	1	0
Balance credit, 31st March, 1897	292	8	11
(Not including Instruments, Music, &c., which are insured for £5000.)			
TOTAL	£330	9	11

ASSETS.	£	s.	d.
Balance in hand, as above	271	10	7
Subscriptions unpaid to 31st March, 1897	28	19	4
Rebate of Income tax 1896-7, (not yet passed)	30	0	0
TOTAL	£330	9	11

F. O. BARRINGTON-FOOTE, Lieut.-Colonel R.A., *President.*
F. J. S. CLEEVE Captain R.A., *Secretary & Treasurer*

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our fire the battery commander must be able both to observe his fire and to command his battery. The ground must, therefore, afford a position for him close to his battery from which he can see the target.

This is frequently a difficulty with a single battery. What are you going to do in the case of the centre battery of a brigade division? Unless you mount the battery commander on an observatory, I cannot see how he is to observe his fire without being shot, or at any rate considerably disturbed, by the flank batteries. I notice that no one has yet advocated the adoption of the portable observatories which have been experimented with on the Continent. Like many other excellent things, I am afraid they would be killed by ridicule in this country.

II. and III.—You cannot change your target or concentrate your fire without making elaborate arrangements.

Concentration of fire in its tactical meaning is practically change of target. I have, therefore, taken the two together.

How is this to be carried out when firing from behind cover? To take a couple of simple cases :—

A brigade division is firing from behind cover against an enemy's brigade division. Each battery has ranged on the battery opposite and the brigade division commander wishes to concentrate his fire on one of the enemy's batteries—say the left. That means that our right battery has to change its target to one more than 200 yards distant.

Field Artillery Drill, p. 16, 28.

Infantry Drill, p. 116, 117.

Another case—"When the order is given for the infantry to advance . . . every gun should at once be turned upon the points selected for attack, and upon any troops which may take the infantry advance in flank."

Field Artillery Drill, p. 28.

And again, in the defence,

Field Artillery Drill, p. 31.

"As soon as masses of infantry or cavalry become visible . . . . or, as soon as the assailant's infantry advances to the attack, the defender's artillery must direct its fire exclusively on them."

How are such tasks to be performed if you are firing from behind cover? They cannot be arranged for beforehand, because the concentration required will not be known until the action has developed. The whole business of planting aiming posts, &c., must therefore be commenced over again—very possibly with the result that, with the new elevation and direction, the shell will not clear the ground in front! Even if it will do so your arrangements will probably not be completed until the opportune moment has passed!

Major Keir commences by saying that concentration of fire will be practically impossible in future, even when firing direct; that changes of target are only a practice camp condition; and that on the battlefield, "where your action is to a great extent dependent on the adversary," difficulties of changing target will be much less felt. I do not think many officers will agree with any of these conclusions. Even if changes of target are not very frequent, surely when they have to be made they should be made promptly.

Having so far deprecated the necessity for being able to change

your target at all, Major Keir goes on to suggest that *with his proposed method of firing from behind cover,* "with practice, changes of target can be made as rapidly from behind cover as by the direct method." And also "by this method the same latitude of field of fire is open to a battery using aiming posts and forming one of a number in a line of guns as to a battery using direct method, for neither can make a change of front without impeding the fire of the other batteries on either or both flanks." I confess I cannot follow him here. A battery in position which gives the first advantage laid down for an artillery position—a clear view over the sights of the target and of all ground on to which it is probable fire may have to be turned—can change its line of fire 45° to either side without any change of front by a simple movement of the trails. Major Keir supposes his guns in action in such a position that the No. 1 standing on the carriage can just see the target over the crest in front. To change target then the No. I has to mount up again, direct the gun on to the new target and get the aiming post planted. If all goes smooth this must take much longer than a simple movement of the trail; but suppose the No. 1, having mounted on the carriage, cannot see the new target? and this will probably be the case. A new position, from which all the Nos. 1 mounted (on their horses this time) can see the new target, must be reconnoitred and occupied, and then, to add to the difficulty, the question of impeding the fire of the other batteries by this change of front must not be forgotten.

Field Artillery Drill, p. 12.

IV.—You cannot fire at moving targets at all.

Far more important than the question of change of target is that of moving targets. I will only take the main points, leaving out such details as that Major Keir assumes the only pace for cavalry on the battle-field is the gallop. He states that the regulation method of firing at moving targets "assumes that the attacker will advance over a level plain and be visible during the whole advance;" such an assumption is absolutely new to me and certainly not warranted by anything in Field Artillery Drill. It must be somewhat of a surprise to officers who have practised here; our targets certainly never advance over a level plain, nor are they in all cases visible during the whole advance; our cavalry targets certainly do not attack a battery "over a mile of clear and open ground by a purely frontal attack, after having given it time to pick up the range." One of the great points brought out by the trial of the regulation method when tested against another proposed by various officers was that "its advantages are especially apparent when the advance of the target is irregular."

Annual Report School of Gunnery, Horse and Field Artillery, 1895.

R. A. I. "Proceedings," Feb., 1896.

Even more extraordinary than the assumption quoted above is this declaration of faith:—"To sum up in one general creed. The moving target, though most useful as an exercise at the practice camp, will rarely be able to be practised in its entirety on the manœuvre ground."

Until I came to the summing up I presumed that "on the manœuvre ground" was a slip for "on the battle-field," but I find that it is

seriously advanced as a proof of the unimportance of firing at moving targets that this fire is rarely or never employed by single batteries at "manœuvres." How can it be so employed when the rules for the conduct of field manœuvres distinctly ordered that "except when ranging, no other nature of fire (than sound signals) will be employed with blank cartridge." This is scarcely an argument against the necessity for being able to fire at moving targets on service, any more than the fact that "it is never practised by units larger than batteries at all." Surely everyone knows that this latter is simply a question of there not being enough targets or horses to pull them. This year brigade divisions at Okehampton will practice at moving targets.

Infantry Drill, p. 252.

If there was one subject above all on which I thought opinion was unanimous, it was that in war we should have to shoot at moving targets and that the great defect of our practice camps was the want of a sufficient number of such targets. I have had exceptional opportunities of watching and discussing artillery practice with officers of the other arms, and their cry has certainly always been—"We should not stand still to be shot at."

Take cavalry drill, field artillery drill, or infantry drill—all inculcate the same lesson. In attack or in defence it is the enemy's cavalry or infantry that are the paramount target. And yet Major Keir sums up that firing at moving targets, "beyond a useful exercise at practice camps, is of little real value!" If it is *of little real value*, it certainly is *not* a *useful* exercise at practice camps, where training for service should be the sole end kept in view.

Into the question of Major Keir's proposed method of firing at a moving target from under cover it is not necessary to enter, because he proclaims its utter uselessness when he says "we are treating an advance over a level plain. A page or two further back he has stated very truly—"It may also be taken for granted that the sites of battles are but rarely to be found on level plains," and yet, in order to make a possible system for firing from behind cover at a moving target, he is obliged to fall back on the level plain. Of course the truth is that, when using clinometer elevation, the angle of sight must be taken into consideration. When this has once been allowed for, as at a standing target, it does not interfere with the fire. With a moving target the angle of sight is constantly altering, and altering irregularly; it cannot therefore be allowed for; and practice at a moving target on ordinary ground becomes impossible with indirect laying. Even on the level plain it is obvious that unless the advance is absolutely straight towards the battery the direction will be constantly altering—and the aiming posts will be useless.

V.—Moral Effect.

Major Keir's criticism of my remarks on this head show that I did not express myself clearly. My actual words were—"If you train Field Artillery to consider firing from behind cover as *practically the rule* you will destroy the whole spirit of the arm." By that I did not mean that batteries would actually refuse to advance from behind cover, or that

if in action in the open the gunners would desert their guns; but that the custom of always firing from behind cover would, to quote a German writer, "tend to paralyse the wholesome spirit of initiative." It is only necessary to read Prince Kraft's comparison of the part played by the artillery in 1866 and 1870 to see how habits of peace do tend to keep back an arm in war—without any reason to impute actual cowardice. Last year Major Keir evidently felt this himself, for he said:—

R. A. I. "Proceedings," April, 1896.

"When we call to mind the absurd lengths to which the deliberate method was at one time carried, we may well shrink from a retrograde tendency in this direction; and visions of the *indirect method at 600 yards and a perpetual search for cover* rise before us." (The italics are mine.)

This year, however, in criticising my remarks, he says:—

"Are not our officers capable of deciding when cover should be used and when it should not be used, when to advance and when to remain behind cover?"

My contention is this. If in manœuvres you train batteries continually to use fire from behind cover and to remain in their positions when the infantry advance, then when in war the infantry require the support of the artillery, *they will not be there*. We shall have again the infantry saying to the artillery, as Prince Kraft tells us they did to him at Nachod:—

"Here you are at last! Where in the world have you been? We had to allow innumerable guns of the enemy to overwhelm us with a hail of projectiles. We kept on looking to see if you were coming, but you did not come."

Do not, in fact, these very papers of Captain Pilcher's and Major Keir's show that this under-cover business is having this very effect in Germany?

Captain Pilcher says:—

"When once established in a good position the German artillery are most averse to leaving it and *I have never at German manœuvres seen the artillery brought up close to the infantry lines previous to an assault.*"

Another officer quoted by Major Keir says:—

"I saw a division and the army corps attack a masked (marked?) enemy and on each occasion *the guns . . . never changed position*, the range being about 2500."

Instance after instance could be quoted to show the effect of the close support of artillery, when the object of their advance to close range was not such a specific object as knocking down the walls of a village, as Captain Pilcher says, but of giving a fresh impulse and support to the wavering infantry. Von Hoënig describes how, when the 28th brigade were attacking at Königgratz, a battery drove to the front at a rapid rate through the skirmishers and, unlimbering in front of them, opened fire with case at 400 yards. He says:—

"I have never seen a battery handled with such determination or tactical instinct and with such brilliant results. It was the initiative,

the true initiative, of the battery commander that I admire, by which not only were the enemy's battalions severely shaken *but the confidence of our infantry was raised to the highest pitch of enthusiasm.*

This is a very different view to that put forward by Capt. Pilcher, that "it benefits the infantry but little to have moving targets composed of their comrades of the artillery galloping about behind them."

The advocates of this German method do however provide a substitute for this close support. Captain Pilcher describes it as follows:—

"What the artillery does do previous to and during an assault is to redouble its fire, giving 200 or 300 yards more elevation and length of fuze in order to catch the hostile reserves moving up, and preclude the possibility of hitting its own assaulting troops."

Such an expenditure of ammunition may be magnificent at manœuvres, but it is not war. The only people it is likely to do any harm to are the assaulting infantry, if, unaided, they succeed in their attack, and are foolish enough to attempt to push on in pursuit. I only trust that the English Field Artillery will never consider their *rôle* is to sit behind a hill a mile and a half in rear while the assault is taking place, blazing into space, on the chance of hitting the enemy, and in the hope of missing their own infantry.

The criticism of the anonymous German officer cannot be seriously answered, because it is evident that he either did not take the trouble to read my remarks before criticising them, or that he read them in a very bad translation. The following is sufficient to show this:—

German Criticism.	*My Remarks on p. 274.*
"With regard to the remarks on p. 274 . . . to say that *to make use of ground in any way* destroys the spirit of the arm is nonsense."	"If you train Field Artillery to consider *firing from behind cover as practically the rule* I believe you will destroy the whole spirit of the arm."

He states that Jena and Austerlitz were the result of the refusal of German officers to practice the "use of ground" which, I presume, we may take to mean in this connection firing from behind cover. Speaking of the mistakes made by the French artillery in 1870, Colonel Turner says: "'*Fas est ab hoste doceri*,' and it was from such incidents as these that the Germans learnt how not to come into action against superior or anything like equally well armed and trained artillery."

But, if the lesson of Jena was that, "under cover" was the place for Field Artillery, it seems to have been sadly lost on the victors there—anything more opposed to creeping that the action of the French artillery at Friedland and Wagram could scarcely be imagined.

Finally, before leaving the subject of firing from behind cover, I should like to ask Major Keir where he finds that there is any idea of arbitrarily "deciding that direct fire and no other is to be used." I have searched the text books and can find no trace of it. On the contrary, I find in Field Artillery Drill general instructions as to the method of using indirect fire, and, in the Handbook of the gun with which Major Keir's

Field Artillery Drill, p. 93, 94, 95.

Handbook of the 12pr B.L. Gun, Mark I. 1895.

battery is armed, elaborate instructions for the putting out of the aiming posts. In spite of all this Major Keir *submits for consideration* "the issue of clear and detailed instruction for a uniform method of the occupation of position behind cover"!

(*b*) Is it Advisable when Occupying the Main Artillery Position to Unlimber the Guns under Cover and run them up into Position by Hand.

Field Artillery Drill, p. 100.

Practically what this comes to is our "deliberate method," with the addition of unlimbering the guns in the covered position and running them up on to the layers by hand.

To begin with:—Although the writers I have already quoted appear to be much taken with this method, I presume they will acknowledge that the tactical restrictions to the use of the deliberate method apply with equal or greater force to the German elaboration of it. These are that it should only be employed under the following circumstances:—

Field Artillery Drill, p. 15.

When surprise is possible.

When the ground admits of the batteries being halted under cover and *close* in rear of the position to be occupied.

When the advance into this position is concealed from the enemy,

When the range is long and target indistinct,

Assuming this, and assuming also for the sake of argument *(though I do not admit its actual truth)* that a position with the muzzles just showing over the crest is the best one to occupy, let us see what is gained or lost by running up into this position by hand.

Annual Report School of Gunnery, Horse and Field Artillery, 1896.

Both Colonel Turner and Captain Pilcher describe how they saw long lines of German guns brought into action without any sign of man or horse until fire was opened. How was it done? The German system (exactly as described) was tried at Okehampton last year under very advantageous circumstances—in that the ground was good and that the covered position was very carefully reconnoitred and marked so as to get every yard of cover. Yet when the guns were run up by hand the time from their first appearance in view of the target to the first gun being fired was 1′ 14″. When the direct method was employed (at a trot) the time was 1′ 25″ to the first gun, but only 1′ 20″ until the horses had disappeared.

Now what was gained? The difference in actual time from first appearance to first gun was 11″; but I admit that the horses in one case were not seen at all, while in the other they were seen for 1′ 20″. There are some no doubt who will say that in that time they would have been destroyed by the enemy's artillery. Colonel Turner, for instance, says "it is suicidal to unlimber guns in a firing position in sight and within 2500 yards of the enemy's artillery which is already in position when cover is obtainable." I am a great believer in the power of Field Artillery, but I cannot believe that. I wish I could, but there is nothing in the results of our peace practice to warrant it, and we are scarcely likely to be more accurate in war than in peace. I have watched a great amount of practice, both from the firing point

and from splinter-proofs close to the target, and my belief is that at ranges over 1500 yards there must always be an appreciable pause between the appearance of any target and its coming under *effective fire*. I should put it at from 3′ to 4′ myself—call it only 2′ and there is still time for the horses to get away.

Colonel Turner bases his views on the well-known example of the three French batteries at Sedan. I have always been sorry for these batteries: for 27 years the memory of their gallant action has been kept green only by its being constantly quoted as the example of "how not to do it." For instance, it is used as an argument against horsing batteries with greys, and as a proof of the soundness of our general principle, "as batteries opening fire in succession are liable to be overwhelmed in succession a simultaneous advance and, as a rule, a simultaneous opening of fire are essential." It must not be lost sight of that these three batteries came up *one by one* against a whole German brigade division in action.

They also came up to reinforce batteries whose fire had already been nearly subdued. Colonel Turner says that the position they took up was some distance from that of the batteries they were reinforcing and not in the same exact line, but he does not say that they were not at the same range, nor how far they advanced in full view before coming into action. Prince Kraft says that they "trotted up from the Fond de Givonne to Givonne itself and tried to take up a position between that village and the Bois de la Garenne." Annual Report School of Gunnery, Horse and Field Artillery, 1896.

The great question is:—Could they, coming up one by one, have occupied the same position with less loss if they had adopted the creeping system? If not, the conclusion that their losses were due to neglect of this system falls to the ground.

Then again how was it *possible* to bring the guns into action without any sign of a man until fire was opened? Considering that the muzzle is only a little over 3 feet above the ground, I cannot understand how the men *pulling* the guns—double detachments unless the ground is very favourable—are invisible until the muzzle is over the crest.

The solution I would humbly put forward is simply that the guns are halted as soon as the gunners can see the target and never run up until it can be seen over the sights! I am afraid that most of my readers will be able to recall somewhat similar events from their own experiences; and with the Fire Discipline, that from all accounts is maintained in German batteries at manœuvres, this would be quite good enough for firing blank. If so, it is no wonder that everyone is impressed with the invisibility of the guns!

I believe that in reality the position to be occupied would be "given away" by the appearance of the first men labouring at their drag-ropes. To quote a German writer: "When a battery has to take up a position that an enemy can predict, it is of no advantage to have three guns unlimbered while the whole of the detachments of the battery are employed in laboriously dragging the other three into action, thus giving the enemy time to open on the unprepared battery."

The effect on the gunners of this very heavy labour must not be forgotten. In his remarks on the experiments here last year, the Commandant said—"The distance was about 70 yards, with a gentle slope, and hard ground free from boulders and heather. The fatigue entailed was very marked, most of the detachments were quite unfit for their duties for some minutes; anything like accuracy of laying would have been quite out of the question for some time." It is very easy to say that the effect of guns opening fire with blank after occupying their position by this method "was annihilating." It is quite another thing to actually produce an annihilating effect with real shell. It will certainly not be produced while the detachments are in the state described above.

In conclusion, I can only say that the whole question is one of great interest to all Field Artillerymen, and that I trust a discussion on the subject may lead to its being thoroughly ventilated in the "Proceedings." If, however, my own remarks had not been so markedly selected for attack by the opponents of our English method, I should have refrained from taking part in such discussion, because I am very conscious of the disadvantage I am under in not having been present at any German manœuvres. I can only plead in extenuation that my duties here, while preventing me from watching German batteries firing blank, have given me unusually favourable opportunities of watching English batteries firing shell, and that under the nearest approach to service conditions yet attained.

NOTE.—In this paper I have thought it convenient to refer to the method of bringing guns into action described by Colonel Turner and Captain Pilcher as "The German Method." I am aware, however, that the German Field Artillery Drill Book does not insist on this method, and that it is not universally approved of by German officers.

OKEHAMPTON,
May, 1897.

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THE STUDY OF MILITARY HISTORY,

AS

A MEANS OF TRAINING FOR WAR.

BY

MAJOR E. S. MAY, R.H.A.

*(A Lecture delivered to the Home District Tactical Society, 9th December, 1896.)**

MAJOR-GENERAL LORD METHUEN, C.B., C.M.G., IN THE CHAIR.

MY LORD AND GENTLEMEN—Some may think it strange that now, at the close of the nineteenth century, I should think it worth while to enlarge on so well worn a topic as the above.

We live in an age of countless books, of free libraries, public reading-rooms and a multitudinous press. If we are to judge by the aspect of the bookstalls at our railway stations or the difficulty of getting the latest novel from a lending library, everybody is devoted to books and literature of every sort. And yet the truth is that the generality of our officers, whether of the regular or auxiliary forces, and an even greater majority (as is only to be expected), of the men they lead, give but little time to anything beyond what the pressure of successive examinations forces upon them.

I was talking the other day to a publisher and asking him as to the sale of military books, and he finished the discussion by saying, "the fact is the men in your profession don't read anything they are not ordered to!" Then, again, I noticed in a little book that may have surprised some of my hearers as much as it did me when I read it a few months ago, published in America and called "The Soldier in Battle," that across the Atlantic there exists in some minds (for the author presumably speaks for more than himself) a great prejudice against what we call the scientific education of generals, and that in that author's view no man who had graduated at West Point was worth a button in the field.

This is a specimen of what he has to say:—"Again I carried out with me from the ranks, not only the feeling but the knowledge

* Readers will note that, though only published now, this was the first of the lectures on this subject delivered by various lecturers in the course of the current year.—A. J. A.

derived from my own experience and from the current history of the war, that the military salvation of this country requires that the West Point Academy be destroyed. Successful commanders of armies are not made; like great poets they are born. Men like Cæsar, Marlborough, Napoleon and Grant are not the products of schools.[1]

I don't think his opinion is a valuable one, because, as it happens, Grant and Lee (and many another good soldier too) were both at the institution he derides, and the latter, at any rate, will bear comparison with all but the very greatest leader of the world, but I presume he, as he said he did, represented the views of others besides himself, and undoubtedly there is an idea prevalent in some quarters that good generals are born, and not made.

The expression, "heaven-born leader," is one of the common places of literature, and yet it may be proved that in almost every case a successful general has devoted himself to the literature of his profession just in the same way as the successful lawyer, doctor, divine, or even poet has studied that of his.

There is a time honoured saying that "experientia docet." If every officer could have personal experience on the field of battle under modern conditions; if, in place of attending manœuvres, he could take part annually in actual warfare, no doubt he might dispense with text-books. There would, in such a case, no doubt at first be terrible disaster, many lives would be lost that with forethought might have been saved, but the cruel lessons would have their effect in the long run, we may depend upon it they would be laid to heart, and the survivors of the initial reverses would no doubt develop into competent leaders. But we cannot be supplied with such realistic instruction, and therefore we fall back on the experience of others according to the manner in which in any other walk in life we shape our course.

If you have not done a particular thing before yourself you go for advice and instruction to some one who has, and avail yourself of the benefit of his experience. And I may note here that the man who despises theory and reading, and who prides himself on being "practical" as opposed to "scientific," invariably does the same the moment he is called upon to carry out any operation but that of the most stereotyped character.

Now the records of what our predecessors did in war simply place the results of their experience before us, and no one but a very rash or vain man would hesitate to avail himself of that experience. In fact, we might imagine that the more practical a man was the more he would do so, because in place of puzzling a matter out from first principles yourself it is shorter and quicker to get a solution ready made by others for you.

But it is said that the conditions under which modern war will be waged are so widely different from those which prevailed, even fifty years ago, that there is little profit to be gained from the study, for example, of the Napoleonic wars. I have heard men assert that

[1] "From the Soldier in Battle," p. 12.

openly, and many I have convinced believe it but are perhaps afraid to say so. Napoleon himself, however, did not forget to study the campaigns of Cæsar and Hannibal, and no more for the matter of that did Von Moltke.

It is indeed a mere truism to assert that the great principles which make or mar a campaign are eternal, but coming down to something smaller than the great principles, it must be admitted that we need the experience of our grandfathers and fathers to guide us.

To get examples to fit all the combinations of war, you must traverse a wide field. Wars are fortunately not of very frequent occurrence, and the modern ones have been of short duration and have been fought under abnormal conditions in the two greatest instances.

We must go back a considerable way sometimes to find what we want, but in any case we could never dispense with the experiences of our grandfathers if we wished any basis of discussion left to us at all. Inventions are brought out and armaments alter almost every year; what was good enough in "the eighties" is not good enough or new enough now, and the novelty of ten years ago is perhaps obsolete to-day.

Where then are we to find a secure foothold, and on what but an ever shifting foundation of speculation and possibilities are we to build our faith? On the other hand facts, discreetly digested, are always valuable; they alone, whether they be culled from the experiences of our contemporaries or our ancestors, are beyond dispute, and when we find the same facts occurring again and again, it means that they are due to the operation of some essential characteristic of human nature, and we need not hesitate to apply to even the most modern situation the lessons indicated by them.

It is therefore an abuse of military history to confine our range of vision artificially, and to study only the latest campaigns, because in them conditions existed most nearly approaching those of our own time. For one reason it certainly is so, namely, that those who will profit most by the study of military history are the higher leaders, and their influence is felt in the realm of strategy, that is to say, before rather than during a battle.

The principles of strategy do not vary, and strategy or the science of making war on the map, is not affected by changes of armament, although it has been influenced by the introduction of railways and some other modern inventions, just as all considerations are modified by the circumstances of the moment. The precepts of all those who have excelled in war are in this respect the same.

There is in Von Moltke's "Tactical Problems" a passage which puts the matter very well. "Der Grosse Schweiger, a man who was a great student all his life, and in his old age showed himself great in the field, says:—"Strategy is the application of common sense to the conduct of war. The difficulty lies in its execution, for we are dependent on an infinite number of factors like wind and weather, fogs, wrong reports, &c.

If, therefore, theoretical science alone will never lead us to victory, we must nevertheless not entirely disregard it. General von

William very truly says:—"It is a long step from knowledge to doing but it is still greater one from not knowing to doing."

"The best lessons for the future we draw from our own experience; but, as that must always be limited, we must make use of the experience of others by studying military history. Besides which, another means of furthering our education is the working out of such supposed warlike situations as our problems present."

And Moltke's opinion is but a reflection of those which have come down to us from Napoleon and many another brilliant genius. Napoleon, who assuredly was a heaven-born leader if ever man was so, who startled the whole world by the sudden brilliancy of his military career, advised every one who would imitate him, "to read and read again the campaigns of Alexander, Hannibal, Cæsar, Gustavus Adolphus, Turenne, Eugene and Frederick."

That he himself studied them closely is well known, but he did not despise the experiences either of far smaller men. No effort of the great Emperor's genius is more admired than his first Italian campaign of 1796. None bears more strongly the impress of a master mind and none is more worthy of probably the greatest military intellect the world has ever seen.

Yet that was his first campaign. It is the work of a soldier without previous experience in the command of armies, of a young man who had never seen large bodies of troops opposed to one another in the field at all, had never been at manœuvres such as are held for instruction now-a-days, and who must have depended for knowledge on books and the experience of others alone. That a man with such antecedents was able to beat experienced generals at their own game and was able, not only to do well in his first attempt, but to surpass the efforts of almost any other general is surely an eloquent argument in favour of reading military history, and there is ample evidence that in this particular instance Napoleon owed something to the study of past campaigns.

For in 1745 there had been also a campaign in the same territory conducted by a Marshal Maillebois, whose name is unknown to most people, and who is never quoted as a master mind in war. And there is unimpeachable evidence that Bonaparte knew of a very detailed and lucid history of the campaigns of this Marshal which appeared in 1775, and that when he went to take command in Italy he applied to the Minister of War at Paris that he should be supplied with it and the accompanying plans. The assent of the Minister is still extant, and it is therefore reasonably certain that Bonaparte had the work with him.

Not only that, but there is a considerable similarity between Napoleon's conduct of the campaign and that of his forgotten predecessor. In both cases the object was to separate the allies and beat them in detail, in both cases the same passes through the Maritime Alps were utilized, and in both cases the first objective was the same.

I do not quote this example in any disparagement of Napoleon. The credit is his just as is the crown of poetry Shakespeare's, although he often based his masterpieces on stories already turned to account by others, but it is nevertheless an interesting example to us, and another

demonstration of the truth that genius consists in taking infinite pains and neglecting or despising nothing that may aid you on your way.

As regards reading, all the greatest soldiers have indeed set us an example which we would do well to follow.

Napoleon has recorded his admiration for Turenne, and has stated that that great leader had made himself what he was by a laborious study of the art of war.

Wellington told General Shaw Kennedy that he had made it a rule to devote some hours every day to study; and Moltke has admitted how much he was indebted to the Great Frederick.

I will not weary you by quoting further evidence in support of my contention that soldiers should study their profession as carefully as other men of business do theirs. I believe most people really think so now-a-days, and that the old, what I may call, Philistine views are dying out.

But there are different ways of studying, and time may not be as profitably spent as possible even in a library.

We have of late been flooded with memoirs and reminiscences of celebrated warriors, and the demand for these books argues for their popularity. Every now and again in them we come across facts which are undoubtedly of great service to us towards a study of our profession, small details which perhaps help to fill up the evidence necessary to elucidate some disputed point in a great controversy, or corroborate what we may have had reason to suspect already.

But there is a good deal often of the tittle-tattle of history in them too, and they are occasionally rather more amusing than valuable. There is likewise a danger in pushing research in the direction of what I may call antiquarian interest too far. The details of pay or interior economy, or of the pattern and variation of uniform and equipment sometimes occupy too large a space in the minds of readers.

Just as Napoleon tells us how the King of Prussia and Emperor of Russia, when in conversation with him, argued about the number of buttons a dragoon should have on his jacket, and clearly thought it an astonishing carelessness in him that he did not seem to care to take part in the discussion.

I have known men bestow infinite pains and much time and labour in an endeavour to decide whether there was one gun more or less in a battery on some particular spot, or as to the precise formation of a body of troops. I know that I have met officers crammed to the brim with the names of the commanders of the various units of a campaign, the exact pattern of the guns and of the rifles, and perhaps so absorbed in their study that they disregarded the real causes that contributed to failure or success.

I do not say that such close analysis is not often valuable; I think patient delving amongst old records occasionally produces very valuable results, but such labour should be undertaken with some practical object in view and while not necessary for all, is not even desirable for young men except as a pastime or amusement. What we should rather desire is that men should read and continually apply their reading to the

circumstances of our own time, draw influences with judgment, and make recorded facts and incidents; as it were, act as pegs in the memory on which to hang principles of value for every-day use.

It is for this reason that I regret that we have now-a-days so much tactics and so little history in the courses of study our regimental officers have to go through, and that I would wish men to read more for the sake of acquiring general knowledge than because they may have to answer certain questions.

I would have a cavalry officer familiar with the deeds of Seydlitz and Kellerman, Lasalle and Von Bredow, remember, Rossbach, Zorndorf, Marengo, the pursuit after Jena, and the surprise of Vionville, and eager with an ambition to emulate such deeds as those.

I think every gunner should know the story of Vittoria and Wagram Hasse's and Gnügge's batteries at Gravelotte, of the "battery of the dead" at Königgratz, and should enter a battle animated and sustained by the remembrance of the great performances of his predecessors on those occasions.

Similarly every infantryman should be persuaded of the invincibility of his arm, not because of the powers of the modern rifle which he may handle, but because his predecessors showed him the road to victory when they fought at Quatre Bras, at Inkerman, or at the Shipka Pass.

To read for the purposes of the moment is only however one outcome of the spirit which has invaded many of our ideas and institutions in this nineteenth century, everywhere people look for quick returns brought about with a minimum expenditure of trouble or time, and there is thought to be no opportunity in these crowded days for the thoughtful and patient labour which characterised the methods of our fathers. Men now only wish to learn just what will be the most useful at the moment passing over them, and the systems of examining officers according to a progressive standard, has something to do with it. Officers too really are busy now when with their regiments, and naturally when pressed for time turn it to the best account for examination purposes.

Thus it is that "Tactics," and that too in a very condensed and artificial form, has pushed history somewhat to one side, and that we find men learning by rote what is likely to be asked rather than what may be very valuable some day, but it is not so at the present moment. Thus it is that text-books are full of data as to the exact number of inches bullets will penetrate into various materials, and that minute calculations as to the exact time a certain force will take to move from one formation and get into another, or that necessary for the last man to move off parade when a force is making a march, fill the minds of students.[1] Or they learn by rote "the characteristics" of the various

[1] Napoleon's method is here interesting, and is thus accounted by Jomini, "Art of War." "Provided with a pair of dividers, opened to a distance by the scale of from 17 to 20 miles in a straight line (which made from 22 to 25 miles, taking into account the windings of the roads), bending over, and sometimes stretched at full length upon his map, where the positions of his corps and the supposed positions of the enemy were marked by pins of different colours, he was able to give orders for extensive movements with a certainty and precision which were astonishing. Turning his dividers about from point to point on the map, he decided in a moment the number of marches necessary for each of his columns to arrive at the desired point by a certain day, &c."

arms, or the degrees of slope on which they can move.

A subaltern will regard it as a waste of time to penetrate as far as a captain is required to, and the latter will be careful not to cross the limit assigned to a man of his rank. Yet it is while we are still young that our ideas are most easily moulded, and it is our early training which sticks to us through life. A man's responsibilities, too, become greater as he becomes older, the command of a battery, battalion or regiment implies a considerable amount of office work, and when he attains to it he has less time to read and is often too weary of books to do so.

Neither do the chances on active service come only to the seniors. Bonaparte at Rivoli and Wellington at Assaye were younger than are many of our subalterns, and the exigencies of a campaign may easily throw a command upon a youth which in peace time he would not inherit till he was grey headed. A subaltern may easily have to take the place of major, or even colonel, at a moment's notice, for, be it remembered, that at Vionville the Fusilier battalion of the 40th regiment lost all its officers between 10 and 11 a.m.; facts, formulas and statistics badly put are soon forgotten when the emergency for which they were learnt is past and done with, and studied in that way the dry rules which are culled from military history soon come to be regarded by the student rather as useful for examination purposes than for practical application in the field.

There is another plan, and we can hardly afford to despise it, and that is, if possible, first to imbue a boy with the spirit and love for the game, to make him understand its broad features, and then, when you have roused his attention, lead him on to examine into the causes that produced victory or defeat. If you wished a boy to become a good whist player you would not begin by making him read extracts from Cavendish. You would let him play "Bumble Puppy" first of all, and then gradually entice him to mould his play on scientific principles, little by little carrying him further as his interest grew.

It is an abuse of a most entrancing part of literature to cut out all the romance and human nature and leave only the dry facts to be learnt by heart.

A pudding with all the plums pulled out may be equally nutritious, and, even theoretically, more wholesome than one rich with such attractions, but a child for all that, will not enjoy it, or even eat it, and even if it be compelled to swallow it, will not derive the same benefit as if it devoured it with zest and pleasure. A boy, (and a soldier, or even an officer, is often still a boy, even when he has been a good many years in the service,) when he first reads campaigns will pick out all the fighting, just as a child will seize the plums in the pudding, and if it arouses his interest and enthusiasm it is quite right that he should do so. But very soon, if he has intelligence, he can be led to inquire how and why the encounters which delight him were brought about, the glowing tale will tempt him also by degrees to investigate closely the reason why one hero was defeated, or why another won, and he will soon begin to probe into the mechanism which sets military machinery

in motion. He can gradually be made to understand that there are certain rules which are the outcome of experience, and which it is hazardous to infringe, and finally he may be drawn to inquire into the host of technical minutiæ which go to build up efficiency in vast bodies of troops. He will look at things first of all from the purely general view of a spectator, then as a professional man seeking guidance, ultimately he may devote himself as an expert to some small details of the machine, or even set himself to master all the niceties of a most complex organisation. So that it will be understood that while it is an abuse of military history to read it as one reads an exciting novel, and leave the dry details altogether out of sight, it is equally an error to trust only or chiefly to a knowledge of them and to despise the less technical writings.

A soldier ought to be so saturated with the spirit of military principles that he will act in a crisis almost intuitively.

He ought to be so imbued with knowledge that it may be no effort of memory for him to consider what he ought to do. And I believe there is no better way of fixing knowledge in the mind than by means of apt illustrations from real life. It will make little impression perhaps if you tell a boy or a man not to bathe in a particular place, because there are dangerous currents or weeds there and he will very likely not heed you; but he will prick his ears if you tell him that Jack so and so was drowned in that very spot five years ago.

It is the fashion to suppose that the officers of our army read very little or knew very little of the science of war at the commencement of the century. I doubt very much if this is really so much so as is generally supposed. I know that I have often been surprised at the number of military books I have found in the libraries of country houses collected perhaps by some father or uncle who was a Peninsular veteran.

And the same thing has struck me when reading old letters, such as those recently published by Colonel Siborne. When fighting on a grand scale was constantly going on and our opponents were the greatest military nation of Europe, it would indeed be surprising if some of our officers, at any rate, did not give some thought to a science on which their lives depended.

When the Union Brigade went tearing down the slope on D'Erlon's corps and the third line was not held back in reserve, did not Lord Anglesey blame himself and that the more so because he admitted that he ought to have known better from previous personal experience in Spain! And did not the officers know that it was all wrong, too, just as well as though they had passed for promotion? Certainly they did. In one of the letters I have just referred to, there is a passage about this very incident which says, "Every cornet knew what would happen."

And yet Von Bredow, in 1870, charged without supports and his brigade was cut up just as was ours at Waterloo and for exactly the same reason. If Waterloo had been kept in mind would not the 6th Cavalry Division have been sent to his support? And will it not be of advantage to us if our future cavalry generals lay the lessons of

military history to heart and, when they launch their squadrons, remember what happened to both Lord Anglesey and Von Bredow, and profit by such experiences?

That an attack by infantry should be duly prepared by a concentrated and fierce cannonade on the point of assault is again a principle which Frederick the Great learned by bitter experience at Kunersdorf. Read that story and note how the power of artillery even at that comparatively primitive stage of its development was able to assert itself and how the neglect of that salutary principle of tactics which I just quoted brought sure ruin in its train.

A German writer has truly said that had the precepts of the great king been regarded in 1870 many a German soldier's life would have been saved. Here, at any rate, we have one lesson from real life which should have been laid to heart and, had Kunersdorf not been forgotten, the smooth glacis of St. Privat would not have been strewn with dead. But St. Privat and Kunersdorf, and many another lesson too, were all lost sight of by the Russians at Plevna, and the neglect of what the lessons of military history have taught us, led once more to confusion and disaster. At Lovtcha we see, on the other hand, the teachings of military history were paid attention to, and the best results were achieved.

Is it not right then that we should endeavour to fix such names and the experiences they bring with them in the minds of our officers, so that in the hour of need they may be present to their minds and that they may remember Kunersdorf and Vionville and St. Privat and Lovtcha and profit by the mistakes of those gone before? But it is not only to furnish precedents, or as an *aide-memoire*, that the study of military history is valuable.

There is surely a moral benefit to be derived from it, which we should not neglect in educating a younger generation, and we should not reduce everything in our instruction to its exact commercial value as quoted in the morning's papers. Even city men recognise that there are some investments valuable as a "lock-up."

Military history is surely the mother of *esprit-de-corps* and patriotism and self-respect, and without these the best equipped army in the world will crumble under the stress of privations or disaster. We may not find many valuable tactical or strategical lessons in the history of the Crimean war, but is that any reason why the story ought not to be familiar to every man who wears the Queen's uniform? Is there not a lesson and a worthy example in the tale of how the mud and frost and snow and wind were patiently endured by men ill-clad and only half-fed, and of how they bore themselves through it all till success came to them at length? Or did our men to no purpose brave the scorching heat of the ridge at Delhi even though that siege does not furnish "a text-book example" to be studied for the next examination? I say that tale and many another from every climate and every quarter of the globe should be read and read again, even as Napoleon advised his son to study the deeds of "the great captains," and it is from the foundation of the enthusiasm and resolve engendered by the memory of what our

forefathers suffered and accomplished in the past that we should make our effort to rise to mighty deeds in the future.

Nor should the mental nourishment offered to our boys be too concentrated or boiled down to the severely utilitarian dimensions of an essence.

There may be as much information in a paragraph as in a chapter, as much or more food in a meat lozenge or two as in a mutton chop, but for all that, in spite of theory, the one will be more welcome and more beneficial to a man mentally or physically hungry than the other. And what we want, moreover, is to teach officers to face responsibility freely not to be always trying to remember what the text-book says, but rather to be guided by what the lie of the ground and the circumstances of the moment seem to dictate.

They must read, but we cannot too often repeat that they must be taught to realise how circumstances may modify schemes and how what may have been wise in one case is not judicious in another. I have already spoken of Von Moltke's "Tactical Problems." There is one example in them of particular interest. It is the old difficulty of crushing an opponent between two converging forces which is being discussed and we must bear in mind that the great strategist's own plans in 1866 have been hostilely criticised by some.

That he fully appreciated the risks involved and yet gave due weight to the altered conditions of warfare brought about by the telegraph is amply evidenced when we hear him say:—

"If we succeed in attacking him on two sides and in affecting the junction of two columns on the battle-field, the greatest results are certainly to be expected. So we have done, for example, at Koniggratz in 1866, but is it permissible to suppose this here? No; the enemy will evade such an attack, or assume the offensive himself, in order to fall upon one of our separate bodies with superior numbers."

Again, who can be more full of practical common sense than this great student in his following remarks on another problem?—

"Gentlemen, you can do that only on paper, not in reality; there it would be quite different. Others again have shifted the bivouac in the evening. Gentlemen, imagine the situation as it is in reality. The division only moved into bivouac in the evening and, therefore, after a long march; the kitchens are dug, the kettles are on the fire. Then comes a General Staff Officer and says: 'The bivouac is to be shifted, you must move a little bit further.' Then the men must start again, the horses must be harnessed, the meat cannot be boiled. One does not really do so in reality."

Now it is because it promotes the constant reference of what is proposed to be done to what actually has been done in war, the judicious weighing of what is possible with what is practical, that makes military history so valuable. The knowledge we derive from it should be regarded as a great storehouse of experiences from which, if we only possess the catalogue, we can obtain an example which, considered with due regard to the circumstances of the moment, may help us to a sound conclusion.

What we want to do then first of all is to fix military history in the

memory and to do this I do not think it is possible to over-rate the benefit to be derived from its study on the ground where the actual events took place. Some years ago now I spent a month with some officers in the Austrian army at Vienna, and I was fortunate enough to get leave to accompany one of the classes of field officers preparing for promotion in its work.

As you know, the neighbourhood of Vienna is rich in reminiscences of the Napoleonic wars. There are the battle-fields of Wagram and Aspern and the island of Lobau with the traces of the French occupation still quite distinct. Landmarks of stone are placed to show the details of the great camp formed there in the early summer of 1809. You can see the spot where the Emperor's tent was placed, the site of the hospital, of the grave-yards, the powder-magazine, &c.

The position of the various bridges which were thrown across the Danube are also commemorated, while the works thrown up to protect the camp and the roads made by Napoleon still remain almost in their entirety,

To read history on such ground was a delightful experience, and I was much struck by the manner in which such advantages were turned to account by the staff officers who were the instructors of the course. We walked over the ground and listened to a lecture on the events which had occurred there, and subsequently groups of officers were sent on various errands which help to fix in their memories the problems and difficulties which were presented to the minds of those engaged at the commencement of the century.

One party sketched the bend of the river, another the available camping grounds, a third mounted the spire of the neighbouring village of Enzersdorf, and brought back a report of all the country that was visible from thence, some meanwhile followed the passage of the French troops, some studied the arrangement of the camp and thus a clear impression of the events of 1809 were carried away.

Another day or two was devoted to the battle-field of Wagram, and the tactical lessons to be drawn from that mighty struggle were considered on the scene where it actually took place. Such a manner of studying military history is undoubtedly the best, but unfortunately in England we have no modern battle-fields to visit.

We are as a nation, however, much given to travel, and no very great effort is necessary in order to visit the ground round Metz, and the battle-fields of Waterloo and Quatre Bras. Foreign, or at any rate Austrian officers, travel but very little, and only comparatively few have indeed been in foreign countries at all, but they can fall back on what they find at home, and have military history at their doors, so to speak.

Not but what I think something is still to be learnt even from the mediæval battle-fields which we do possess and which few people even go to see. Those of the Civil War, at any rate, can still enforce a lesson, if only they bring home to us the genius of Cromwell and his ability as a leader of horse. And wandering over them during a holiday will set many a brain which is stored with military history thinking.

It scarcely comes within the scope of what I have to say to-night, but it is possible to give special and unique interest to educational exercises by an attempt to reproduce a fac-simile of some foreign battles on our soil at home. Just as a situation analogous to such a one as that which preceded the crossing of the Sambre by Napoleon in 1815, can be placed before us on the maps of a war game, so may it be at least partially revivified on the hills and valleys round our garrison towns.

If troops are not to be had, and it is not often that they can be present in sufficient numbers, the positions of imaginary units may be shown by flags and orders may be written just as though the men were there in the flesh. And this brings me to another method of instruction in Austria which had, I thought, good results. Officers were given a small force, the different component parts of which were represented by various coloured flags. Thus a white banderole may have stood for a battalion, a red one for a battery and a blue one perhaps for a squadron.

General and special ideas were drawn up and orders were written out as they are at a war game. Then the banderoles were placed to mark the positions selected for the troops on the ground itself. Sketches of the position showing the manner in which it had been occupied were then made and a criticism was given on the ground just as is the case after a field-day at Aldershot. We have done the same sort of thing in this country in the form of "staff rides" and I think those who had the privilege of taking part in such exercises will agree with me that there is a great deal of instruction to be gained from them.

The interest will be heightened, if it is possible to say to an officer after the work is over, "Well you were confronted with much the same difficulties and on much the same sort of ground, as faced Graham at Barossa, or Valentine Baker at Tashkessen."

His curiosity will be roused, if you add, "This is what happened," or "This is how so and so got out of the scrape." Although the similarity may not be always complete, still the introduction of even the small amount of realism, and human nature, indicated here will tend to waken attention and adds piquancy to what otherwise is apt to be regarded as a dull academic exercise. The touchstone of facts applied even to this slight extent, quite changes the attitude of many a man's mind and awakens sympathies and interests which would otherwise go on slumbering indefinitely.

Finally, in these days of long ranges and wide distances, we must remember that the strategical nature of operations has acquired an enhanced value. It is not possible any longer even for comparatively subordinate leaders to influence the character of the fight, or to make good deficiencies of plan by a quick or clever tactical movement. Tactics in the presence of the enemy are now elevated very nearly to the height of strategical movements which direct the great blows of a campaign.

Strategy relies on tactics to achieve its objects, but the best tactics will but rarely atone for a false strategical situation. Similarly, a well

directed attack may succeed just because it rests for its success on the foundation of a judiciously conceived plan and a badly directed one will fail, in spite of the bravery and skill of the subordinate leaders, for the opposite reason. The general on the field of battle can, now-a-days, only sketch in the broad features of his conception and must leave details of execution to those beneath him. His influence, therefore, is likely in the future to have more of a strategical character than was formerly the case and it is strategy which is pre-eminently taught by a study of military history.

It deals with principles not with details of execution, it is the spirit and not the letter of the law which it reveals and while an appreciation of the former produces generals, a rigid resistance on the latter may develop a pedant and pedantry has led, perhaps, to more disaster in war than any other vicious tendency.

Again, while in the less urgent moments of active service we require men to know minute details, in the supreme crisis of war when their own fate and the fate of those they command depends on the soundness of a decision which has to be formed on the impulse of the moment, we look to them to act almost intuitively, and thus to act means to strike in accordance with broad principles which, even if they do not ensure victory, at any rate, make it more attainable, which promise the greatest results to a success, while they minimize the risk of a disaster.

Such principles are part of the eternal truths of the world. They do not alter with equipment or armament and change but little even with the lapse of centuries. They rest ultimately on human nature and that is a quantity which has varied but very slightly since the world began. It is principles that we seek in military history and in commending its study to those who are interested in military affairs, I do so in the belief that it will help to enlarge their grasp of military science, and while reminding them that they must ponder over details, will teach them how the knowledge they acquire may most wisely be applied.

ACCIDENT TO 12-INCH B.L. GUN ON BOARD THE RUSSIAN BATTLE-SHIP "SISOI VELIKI."

BY

CAPTAIN H. FORBES MACKAY, R.M.A.

A GUN accident, which was attended with more disastrous results as regards both loss of life and damage to *matériel* than any which have occurred since the bursting of the *Thunderer's* 38-ton gun in 1879, took place on board the Russian battle-ship *Sisoi Veliki* during target practice on the 15th March last.

The *Sisoi Veliki* is a second-class battle-ship of 8,880 tons; she is quite a new ship; built at St. Petersburg and launched in June 1894; she has only been attached to the Russian Mediterranean squadron since the end of last year; she has unarmoured ends, but is protected by 16 inches of nickel steel side armour 7 feet deep for a distance of 247 feet at the water line, above which is an armoured (5-inch) casemate 195 feet long, closed at the ends by traverse bulkheads.

Her armament consists of four 12-inch L/40 Obukhof B.L. guns mounted in pairs in turrets, one forward and one aft, in the middle line, protected by 12 inches of nickel steel armour. In the central battery are six 6-inch quick-firing guns, and thirty-six 3-pr. and 1-pr. quick-firing guns are distributed between the decks and the tops of the two fighting masts.

The engines are of 8,600 horse-power and she is said to have a speed of 16 knots.

On the 15th March last this ship proceeded outside Suda Bay, Crete, to carry out target practice.

It appears that three rounds had been fired with full charges from each gun in the after turret, the guns in each case being fired simultaneously by electricity by an officer from the sighting position in the turret. For the fourth round the guns were loaded with a 729-lb. projectile and a half charge (about 200 lbs.) of prismatic powder and trained on the port beam; upon their being fired a terrific explosion occurred. The whole of the top of the turret was blown off, it divided into two, and while the after half went overboard clear of the ship, the other half flew upwards, struck a small gaff, carrying it away and, falling over the mainmast head abaft the fore bridge, broke away one side of the bridge and finally landed on the deck causing considerable loss of life.

The woodwork in the turret caught alight and threatened to com-

municate through the wrecked floor with the powder and shell magazines; the flames were extinguished, however, in less than two minutes.

On examination the turret was found to be completely wrecked, it had become uncentred and sagged down so that it was impossible to move it. It was found that the accident had occurred to the left gun, whose breech-block had been blown out straight to the rear and had made an indent three inches deep in the turret armour. The block itself had rebounded intact from the armour and the gun was found to be practically uninjured.

The right gun fired correctly, but its hand-loading mechanism is said to have suffered very considerable damage from the force of the explosion.

The hydraulic gear in the turret was broken and twisted into all manner of shapes.

As regards the number of persons killed or wounded by the explosion, the various accounts which have appeared vary considerably. It would seem, however, that there were in the turret at the time the gunnery lieutenant, an engineer officer with the relative rank of lieutenant, and at least eight men.

Strange to say, notwithstanding the tremendous heat and blast to which they must have been exposed, all except the gunnery lieutenant, who was in the sighting position, were able to crawl out or to be helped out of the turret alive, but the engineer officer and most, if not all, of the men are believed to have since died.

A considerable number of the ship's complement were evidently on deck watching the practice, and the half of the turret which fell on the deck is said to have killed instantaneously at least 15 men. Altogether, 26 officers and men are said to have been killed or to have since died of their wounds, and 15 others to have been wounded, making a total of 41 casualties.

The casualties caused by the bursting of the 12-inch 38-ton M.L. gun on board H.M.S. *Thunderer* on the 2nd January, 1879 were as follows:—The officer of the turret and 8 out of the 9 men who were in it were killed, the one survivor being very much injured. One officer and one man on the battery deck were killed and 34 other men were more or less injured, *i.e.*, 11 killed and 35 wounded, making a total of 46.

And now to come to the cause of the explosion. The threads on the outside of the breech-block having been found to be uninjured, as well as the threads on the inside of the gun, and also the breech-block having struck the interior of the turret armour immediately in rear of the left gun, all point to the conclusion that when the guns were fired the breech-block of the left gun had been pushed home, but not given the sixth of a turn necessary to finally secure it.

It seems almost incredible in these advanced days of perfection in automatic mechanism of all kinds that a gun should be mounted on board any vessel and not fitted with an automatic safety arrangement to prevent the gun being fired before the breech was properly secured.

Yet, practically, all the telegrams and reports which have appeared on the subject of this accident agree with the circumstantial evidence, meagre though it is, and plainly show that if some such safety arrangement had existed the accident could not have occurred.

The 12-inch L/40 B.L. guns mounted on board the *Sisoi Veliki* are steel built-up trunnionless guns, 40 calibres in length and weigh 41.5 tons; with pyro-collodion smokeless powder, they are said to give a muzzle velocity of 2800 f.s. to a 729-lb. projectile. It will, however, be noticed, as mentioned above, that at the time of the accident prismatic powder was being used.

The manufacture of these guns was only commenced in 1893 at the Obukhof Works, Alexandroski, Russia, the designs for both the guns and the breech mechanism are said to have been supplied by Canet.

The following extract from the *Times* of the 2nd April last show however that although Canet's design of breech mechanism has been taken as the model, the details have been somewhat modified by the Russian authorities :—

"M. Canet writes to point out that his system of closing the breech has only been supplied to the Russian Admiralty for quick-firing ordnance up to 15^{cm} (6-in.) and not for guns of large calibre.

"It is possible, he says, that certain portions of the breech-closing mechanism for the heavy guns, the plans for which are prepared at the Obukhof Works, may be similar to those in the Canet design, but he claims for his system that with it such an accident as occurred on board the *Sisoi Veliki* can never happen, because it affords absolute security against premature fire."

As has already been stated, these 12-inch B.L. guns are mounted in pairs in closed turrets, worked by hydraulic gear and fitted with hand gear as an alternative, and it appears that in order to have the breech-block of the right gun opening to the right and that of the left gun to the left and at the same time to have the guns and mechanism interchangeable, the left gun and mechanism are exactly similar to the right, only turned through 180° in the mounting; consequently the indicator, which shows when the breech is properly closed, in the right gun is on the top of the rear end of the breech and in the left gun it is at the bottom; therefore the two guns when ready for firing do not present the same appearance.

In a French account of the accident it is stated that it is quite possible to understand that the man stationed in rear of the guns thought they were ready because they *did* appear the same. With this we cannot agree, because, as only one-sixth of a turn is necessary to lock the breech, in no position would the breech-blocks present the same appearance.

However that may be, it is quite evident that in the absence of any automatic safety gear the officer in the sighting position is dependent on the man in rear of the guns to inform him when the guns are ready, and the very fact of the accident having occurred showed that the officer either pressed the firing key without waiting to be so informed, or that he was so informed in error.

Whichever of these two things happened, the absolute necessity of an automatic safety arrangement is once more made evident, and the Russian naval authorities are entirely to blame for allowing guns to be mounted in their ships without some such device to prevent the possibility of the premature firing of the gun.

The *Sisoi Veliki* is the only ship actually in commission at the present time carrying 12-inch L/40 Obukhof guns. Of the four first-class battleships, which are each to carry four guns of this type, the *Three Saints* is still undergoing trials, and the *Sevastopol, Petropavlosk,* and *Poltava* are still under construction.

After the accident the *Sisoi Veliki* proceeded to Toulon for repairs; and a special commission, composed of M. Keittritz, of the Russian Department of Naval Law, Colonel Brink, Assistant Director of Artillery at the Russian Admiralty, and Lieut.-Colonel Ivanof, has assembled there to make a full enquiry into the accident.

Let us sincerely hope, in the cause of humanity and for the safety of the Russian naval gunners in particular, that as a result of the report of this court of enquiry all guns of this type in the Russian service will be fitted without delay with an automatic safety firing arrangement which will make the recurrence of such a disastrous accident an impossibility.

COMPETITIVE PRACTICE IN THE GARRISON ARTILLERY AND ITS EFFECT ON THE TRAINING OF OFFICERS AND MEN.

BY

MAJOR C. N. SIMPSON, R.A.

A REPLY.

THE conclusions arrived at by the author of the article on the above subject in the December number of the R.A.I. "Proceedings" are in some cases so diametrically opposed to my own that I venture to set down the results of my own experience, feeling, as I do, that I shall represent the views of a good many other officers in the Garrison Artillery.

Major Saltmarshe must, I think, have based his opinions, on the effects he observed in one particular district, but that the state of things he describes is not universal I shall endeavour to show. I take the alleged disadvantages *seriatim*:—

1.—*The fact that a record target can only be towed at a rate of seven or eight knots an hour induces commanding officers to train their layers at slow moving objects only.*

I have certainly not found this to be the case, for, except when drilling recruits, I have almost invariably noticed that the fastest targets available, such as mail steamers, torpedo-boats and destroyers, were selected, with the idea that men who had been trained at drill to lay on such rapidly moving objects would find it comparatively easy work to lay on the slow moving record target.

2.—*Men are generally trained at drill to lay on a vessel broadside on.*

This again has not been my experience. Of course a great deal must necessarily depend on the position of the particular fort in use, as regards the general course of the shipping and the amount of train-

ing the various guns are capable of. Vessels wishing to enter the Medway for instance must, on account of the lie of the channel, be almost end on to the guns in the forts at the entrance of the river from the moment they come within range until they are close up to the batteries, so that a C.O., unless he wishes his layers to remain idle for the greater part of their time, must necessarily order them to lay on vessels either approaching straight on or going directly away from the battery. Of course I do not mean to say that this is always the case, for the guns in the centre of the fronts of some of the Thames forts from their position must be fought by Running Past points and therefore would always have a vessel broadside on to aim at.

3.—The D.R.F. is almost invariably used for competitive practice and other methods sacrificed to it.

This is not the case in the Thames District, where the companies go through an annual course of 42 days, as laid down in Sec. VIII. R.A.S.O. and are instructed in the use of the P.F., which in 1895 was used by all the companies, in preference to the D.R.F., for their "Competitive" and probably would have been used again in 1896 if the conditions of the competition for the Centenary Cup had admitted of it.

The contention that under the present system one day's competitive firing makes or mars a company is a just one, but how to remedy it is quite another matter, unless a hard and fast rule be made that at their annual practice all the companies forming any particular group must fire the same number of rounds and from the same nature of guns. But, even if this were done, it would be impossible to exclude the element of luck altogether, for one company might have a still day with a good light and a clear range while another had to fire on a dull, gusty day with a foul range.

As regards the selection of competing gun detachments and gun-layers, the present method certainly does introduce a certain element of luck, but the example given by Major Saltmarshe of the effect of this is surely a very uncommon one. The inclusion of five men classed as only "*fairly reliable*" and three as "*uncertain*" amongst the paid layers of a company seems to be open to comment, as it can hardly be contemplated that a man should receive extra pay as a specialist who did not reach a higher standard of excellence in his own particular line than "uncertain"! With reference to the number of rounds fired by a gun-layer previous to the "Competitive" I must say that I have never known it to be so few as only two or three. Generally a large number of rounds of 1″ and M.H. ammunition are placed at the disposal of the company C.O. to be fired from the 6″ B.L. and from Q.F. guns and this affords him an excellent opportunity of testing his gun-layers.

While on the subject of gun-layers, I would like to remark that in my humble opinion it would be a great advantage to the service if the qualifications required of candidates for this appointment were somewhat relaxed.

At present, in addition to passing the prescribed tests as laid down

in the G.A.D., before a man can become a paid gun-layer he must have :—

1st.—A very good character ;

2nd.—At least four years' service ;

3rd.—Passed the examination laid down in Section XLVI. R.A.S.O. for 1st class gunners.

Now to my mind a really first-rate gun-layer is born, not made. Just as no amount of practice will make a man who has no natural aptitude a first-rate game shot, racquet or billiard player, so no amount of aiming drill will make a man rise above a certain standard as a gun-layer. Hence, I would recommend that any steady man who has passed his drills and shews undoubted aptitude for the work and can pass the G.A.D. laying tests should be at once appointed a paid layer without insisting on the other qualifications enumerated above. A similar system to this has, I believe, been successfully adopted in several foreign navies.

The objection that in the "Competitive" *under the present system subaltern officers do not always have their own particular sections under their command and that gun-layers do not work in all instances with their own detachments* is more a sentimental than a real one.

Although excellent in theory, it is impossible in practice. The allotment of men to guns in any given fortress must depend on the numbers required for the ammunition detail, the B.C.'s staff, &c. and the number of guns to be manned, and to arrange that each subaltern should only have command of his *own* section is practically impossible in peace time and would be even more so on "mobilization," when militia and volunteers are brought into play. In addition to this, as only two out of the three subalterns of a company of Garrison Artillery are in command of sections, if this idea was carried out in its entirety, the third subaltern would not be allotted to a group at all.

The present record target is doubtless capable of great improvement and, certainly, a company which breaks up the target at the beginning of its competive practice is decidedly worse off than one which breaks it up towards the end, but whether for this reason only it would be advisable to revert to the Hong Kong target is a very moot-point. Undoubtedly, the men take a far greater interest in the practice when they *see* the actual results of their fire than when they merely *hear* (as is the case in practice at the Hong Kong target) that they have been credited with so many imaginary hits.

The difficulty of ranging on a shattered record target exists during the whole of the practice at a Hong Kong target, besides which the former is a much nearer approximation to the target (an enemy's ship) which would have to be aimed at on actual service.

As regards the suggested modifications in the system of carrying out competitive practice, the first suggestion that a certain number of rounds be placed at the disposal of the company C.O. to be expended in any way he wishes for elementary practice is unnecessary, as it is what is done

already, *vide* pp. 499–500 G.A.D., 1895 and para. 18 "Instructions for Practice Seawards, 1897."

Suggestion 2, that the whole of the practice, except the elementary, should be "competitive," would, I think, be very difficult to carry out, as it would necessitate, as I have already said, each company firing precisely the same number of rounds and from the same natures of guns. This procedure is hardly desirable, as a company who is allotted to a district on mobilization which has nothing but B.L. and Q.F. guns should surely fire a greater proportion of those natures of ammunition than a company allotted to a district in which there are nothing but R.M.L. guns.

Suggestion 3, that a fair proportion of rounds should be fired at the fastest target obtainable, is in my experience already carried out.

To my mind what is wanted is, not so much a revised set of conditions for competitive practice, but a few tugs capable of towing a record target at a rate of at least 12 knots an hour.

I also think it would be a great incentive to the men if every company (whether a prize company or not) which qualified for 1st class were allowed to wear badges. Under the present conditions a 1st class shooting company may be moved to a new station and see the men of another company which has only qualified for 3rd class in possession of badges, while they, the better shooting company, have none.

NOTES

ON

TRAINING ARTILLERY SCOUTS.

BY

CAPTAIN F. R. MAUNSELL, R.A.

The following are some suggestions made with a view of improving the performance of the reconnaissance and scouting duties of artillery in the field.

They chiefly consist in proposals for training a certain number of N.C.O.'s in each battery whose duties would be :—

(1.) To assist officers in reconnoitring positions for guns and the means of approaching such positions.
(2.) To act as combat patrols to protect against surprise.
(3.) To be employed in an officer's patrol detached to a flank to observe the effect of our own fire, or give information of movements within the enemy's position.
(4.) To act as orderlies to connect the C.R.A. with the various brigade divisions and these with the battery commanders.
(5.) For orderly work in keeping touch with the ammunition columns during an action.

The greater efficiency of gun and rifle fire has rendered a frontal attack difficult without great sacrifices; and it becomes increasingly important to train troops to manœuvre, to execute wide turning movements, make long marches by day and night, and utilize to the utmost every favourable feature of the ground.

The use of smokeless powder will help to hide the real position of men and guns in attack or defence and will favour surprises and ambushes, while it will also induce greater circumspection in the attack to avoid being drawn into a useless display of force, or being committed to an impossible or dangerous situation.

It is plain that if the attacker is to execute long manœuvre marches and keep such hidden from the enemy, or if the defender is to ward off the disadvantage of an unexpected attack, it is very necessary to study every portion of the ground and the best means of utilizing it in attack or defence.

Also, considering the improvements in modern weapons and the greater power that these place in a commander's hands for decisive action, the importance of reconnaissance work has much increased and, if turning movements and similar manœuvres are to be successful, a careful study of the ground must form the principal preliminary towards attaining such a result.

In the artillery, the arm that has to commence the fire action, the value of a previous reconnaissance is of primary importance. In the preliminary portion of the action, when the advanced guard batteries, or Horse Artillery with the Cavalry division are sent forward to reconnoitre and make the enemy disclose his position, opportunities will occur for R.A. officers' patrols to examine the ground with a view of occupying it subsequently with the main line of guns or of discovering the probable position of the enemy's guns and how such would appear from the side of the attack.

This need not interfere with the cavalry patrols or reconnaissance, but is purely technical work from an artillery point of view, carried out with a view of gaining the greatest advantage from the ground when the artillery duel commences later.

If such R.A. officer's patrols comprised, in addition to the officer, some N.C.O.'s who had been previously trained in reconnaissance work, reading maps, &c., a very thorough study of the ground could be completed in the short time that would probably be available. Also the appearance of the target which the enemy's line of guns would present, how far they could be screened from view from our position, or the positions of their wagons and limbers, might be discovered from some point of vantage, and would be of great value when pointed out on the arrival of the C.R.A. and the battery commanders later.

At the commencement of the artillery duel the whole of the batteries should open fire simultaneously and, if possible, make their fire come upon the enemy in the nature of a surprise, and it is only by a knowledge of the ground beforehand that such a result can be attained. Some of the batteries also may have to use indirect fire at this stage to get the full value out of the formations of the ground.

The value of the men who had previously been with the officer's patrol would now be obvious, and they could be of great assistance to the battery commanders in taking up position, in pointing out the target offered by their guns and the general line of the enemy's position. When in action they could be employed as combat patrols to guard against surprise or form part of an officer's patrol posted to observe the effects of our own fire from some advantageous position on the flank, give notice of the massing of troops and guns for a counter attack and prepare the C.R.A. for meeting such by artillery fire.

With the assistance of these men when taking up position, the Nos. 1 could be trusted to act as ground scouts and these latter would not be found necessary. The name "combat" patrol has scarcely the same application to artillery as to cavalry and "observation" patrol might more clearly denote the duties in the artillery arm.

Machine gun or magazine fire from a covered position can render a

sudden attack on a line of guns very deadly to men and horses and must be guarded against.

The absence of smoke makes the progress of the battle difficult to follow and, to guard against surprise, these patrols have to be constituted of well-trained men, accustomed to act in detached positions of responsibility.

In executing long marches, to turn the enemy's flank or force him to fight on unfavourable ground, it will be necessary to know the state of the roads, how far they are covered from view and fire and the most suitable positions for guns near them, in case of sudden orders to come into action.

An enemy, well on the alert, may not suffer the turning movement to proceed, but will strengthen his flanks and thus a very probable result will be a hot frontal action commenced suddenly on entirely new ground, the defender being compelled to fight on a field on which he is unprepared and towards which he has to hurry his reserves.

Here again it will be obviously of great advantage if the C.R.A. of the attack has at hand a few officer's patrols with trained scouts to assist in reconnoitring the new ground and the best positions for the attacking batteries.

When the guns are in position and have to act in mass, a certain number of men will be required as orderlies to keep up communication between the C.R.A., the lieut.-colonels commanding the brigade divisions, and the battery commanders. In action this orderly duty will certainly be difficult, and will require a man whose intelligence has been quickened, and knowledge of ground improved by a course of training in map reading and scouting work.

Connection has to be kept up with the divisional ammunition columns and orders should reach them rapidly from the front; this will require orderlies accustomed to map reading and finding their way across country.

To carry out the various duties which have been outlined above, it is suggested that four N.C.O.'s be trained per battery in peace time, and on mobilization be added to the present war establishment and be available for detached duties when the need arose. The post of scout might be made a coveted position for young N.C.O.'s and a small increase of pay attached to it. Men who have passed through this training and risen to the rank of sergeant or No. 1 would be thereby more fitted to lead their sub-divisions into action or across country.

Major May, in his lecture on the "Analogy between the tactics of Field Artillery and those of other arms,"[1] has described the system of employment of scouts introduced by General Tyler in India and alluded to the difficulties of training men on home service, but much may be done by extending and making more real the course of winter reconnaissance in which N.C.O.'s are now directed to be instructed.

After this course it would perhaps be better to complete the men's

[1] J.U.S.I., September, 1896.

training by having a small camp of instruction, held in the spring and lasting about a fortnight, at some part of England or Ireland, where plenty of open ground would be available to work over. The men would then be ready for further training at the larger manœuvres later in the year.

These camps need not contain more than 24 men, or the trained men from six batteries under an officer as instructor, and would be analogous to the small signalling camps that are to be seen in the summer near Aldershot and elsewhere.

This would not entail much expense and the time the men would be away from their batteries would not be excessive.

The training at a central camp would ensure uniformity in the winter training of the batteries, and enable more extended combined exercises to be undertaken.

The system of training should aim at producing a clear and concise report of a position, road, or section of ground; and it will probably be necessary to have some form of rough sketch attached to make it clearer, and to indicate points referred to in the report.

Such a sketch should be devoid of all elaboration and the system so simple that any N.C.O., after due training—whether he be a skilled draughtsman or not—should be able to apply rapidly and effectively.

Scouts will have very little time to complete any form of sketch, and the only materials likely to be at hand on service are a small compass, note-book, black pencil and ruler.

If the sketch were to be of a road, the villages, cross roads, and principal details could be marked on the paper beforehand from a map in the possession of the officer sending the man out.

This would form a rough outline which the scout could fill in as he went, so that his remarks in the margin, together with the sketch itself, would form all the report required.

Similarly, if sent on a mile or so ahead to report on a position, the limits of the ground and any prominent features, such as line of a stream, the distance between villages on or near the crest, should be marked in his note-book from the officer's map, and the man sent to complete the necessary information by writing it on the face of the sketch.

In a great many cases, however, sketches of any sort could not be thought of in the hurry of active service, but still it should be possible for a trained man to write down concisely how the ground lies to the front of the position, what villages or stretches of road are visible, which are hidden by trees, whether the view is clear into the valley in front, any heights commanding the position, what sort of cover there is along its crest and what the slopes in rear are like, ways of approach and so on.

Even this much, without any sketch, but referred to a map in the hands of the officer who receives it, will be of great use.

But, in order to train a man to write such a short report as that indicated above, he must in peace time be taught a certain amount of simple sketching and map reading, to accustom his eye to take in the

shape of the ground, to impress on him the points he should report on from an artillery point of view and teach him to find his way about with the aid of a map if employed on isolated duty.

An officer sent with three or four trained men to report on positions suitable for artillery might divide up the ground for each man, giving him an outline sketch of a certain section with the principal points marked and instructing him to fill in necessary details.

Or, similarly, an outline of two or three miles of road may be given him to report on.

Artillery scouts would scarcely be likely to be called on to do much sketching of entirely new ground and some principal points and distances would usually be available to assist them.

Their work would rather take the form of reporting on ground, the general formation of which is already known, filling in the necessary detail from an artillery point of view, partly in the form of writing and partly in the form of a sketch.

For ordinary use a large note-book, compass, ruler and black pencil should be sufficient. The note-book should be about the size of the message book supplied for army signalling, such as Army Book, 295 (A), but it would be more suitable if of better paper and if each leaf could be readily torn out. The compass should be of the pattern which can be clamped to the note-book at one side.

This would allow details of the sketch to be filled in with the ruler in a similar manner to the cavalry sketching-case and also admit of rough bearings being taken.

The ruler could be marked with the scale in use, usually three inches to a mile.

Contouring is not adapted to this form of rough work; a system of vertical pencil strokes is suggested as more rapid and requiring little skill in execution.

If the slopes are too steep for guns a note to this effect in the margin or on the face of the sketch would suffice.

A short description of the view from the crest of a position, giving exactly what is visible in the field of fire, will be of great value from an artillery point of view. Especially is this the case in the event of a scout being barred from advancing any further than the crest by the enemy's patrols.

It is suggested that ordinary roads, passable for artillery, should be represented by a single thick pencil line, as this would be easier and quicker to draw than the usual two lines. Paths and tracks impassable for guns might be represented by a thick dotted line; enclosures, hedge-rows and such like to be represented by ordinary fine pencil lines; houses in black pencil and woods represented by the conventional sign for trees here and there.

These would be the only conventional signs used, any special information about the road, whether fenced or unfenced, its width, &c., being noted in the margin or on the sketch if it did not overcrowd it.

It is essential that the men should be able to read maps and understand the conventional signs and the use of the north point. The 1″

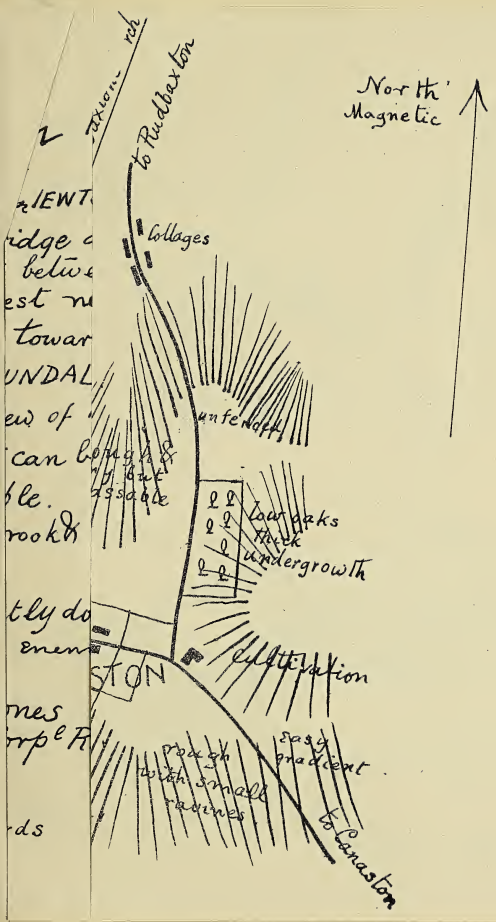
Ordnance Map in England corresponds approximately as regards scale to the maps likely to be used on active service in Europe, and therefore should be used for training the men. In India the scale would usually be four miles to an inch and would not contain so much detail as the 1″ map.

I attach a specimen report and sketch of a section of a good artillery position in the neighbourhood; it should not be difficult to train an ordinary N.C.O. to this standard, while some men with greater aptitude for the work might be trained in the use of the cavalry sketching case.

The sketch is done on paper the size of the signalling message book already referred to. Several names not given on the sketch refer to a map supposed to be in possession of the officer who sends the man out, and who has given definite instructions what to report on.

The cross roads at Wiston and near Fenton Farm, the general course of the Benton Brook, the position of the bridge over it, would be marked for the man before starting, and he should fill in the remaining details.

These few suggestions are put forward with a view to assisting officers in training men in reconnaissance; there are doubtless many others which officers of greater experience can put forward in addition.

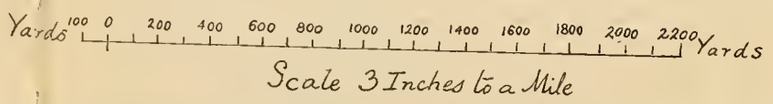

to Rudbaxton
North
Magnetic
Villages
unfenced
four oaks
thick
undergrowth
Cultivation
easy
gradient
Ploughed
with small
ravines
to Canaston

POSITION between WISTON & FENTON FARM

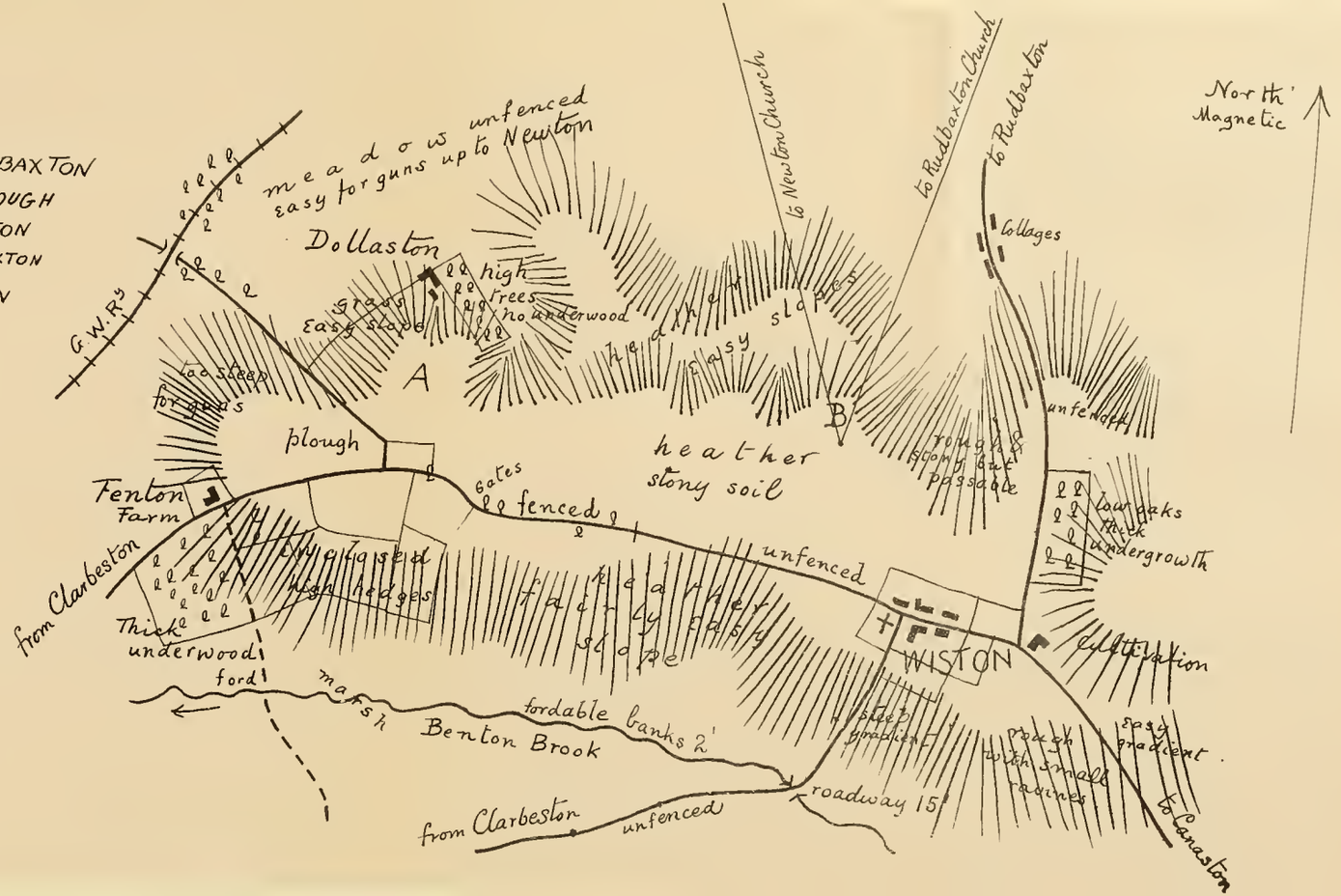
View from B = can see North to crest of hill between NEWTON & RUDBAXTON
Road from WISTON can be seen winding up from bridge at LAMBOROUGH
Valley of LAMBOROUGH brook can be seen except between CRUXTON
& railway where it is screened by high trees — Crest near RUDBAXTON
covered with scattered trees & gorse but gets more open towards NEWTON
View from A to N.W = can see Railway bridge near CRUNDALE &
road from there to RAM'S WOOD, High trees shut out view of ROYSTON
CROSS — EBDALE village & valley for 1 mile above it can be easily
seen — only spire of EGREMONT church & a few houses visible.
Trees of DOLLASTON wood screen view of LAMBOROUGH Brook & village
High hedges towards FENTON FARM —
Crest of Position is from A to B; ground slopes gently down
from A B to WISTON — FENTON road — cover from view of enemy's
position could be obtained on this road —

· I. Jones
Corpᵉ R.A

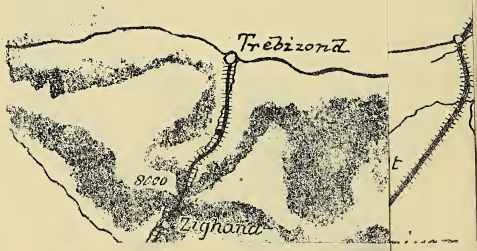
WISTON 11-30 A.M. 15.7.97



Scale 3 Inches to a Mile



BLACK SEA
TIFLIS
1100
Old Russian frontier
Akhalzik
Batoum
Ardahan
Kur or Cyrus R
Trebizond
Alexandropol
Delijan
Lake
6500
Siwan
KARS
Alagöz Mt
13,000
Russian frontier
Lighano
Chorok R
Echmiadzin
Erivan
Ardost
Gumush khane
Baibourt
Kop
RUSSIA
Igdyr
Ararat Mt.
17,000
ERZEROUM
6100
Ashkala
Küzlu
Bayazid
Diyadin
Aras or Araxes R
Erzinjan
Western Euphrates
Egin
Kara Su or
Bingöl Dagh
Melasgird
TURKEY
Azizie
Sipan Dagh
BOULANYK
Murad Su or Eastern Euphrates
Mush
Archag
Lake of Van
5000
Warak Dagh
VAN
10,000
PERSIA
SASSOUN
Bitlis
Bashkala
Bohtan Su
Sert
2500
Lake of
Urumiah
4000
Urumiah
DIARBEKIR
Julamerik
Jelu Mts
12,000
Tigris R
Great Zab R
Scale
0 10 20 30 40 50 60 Miles
Heights given approximately in feet above sea level.
Col. Clayton's routes.
Clayton


BLACK SEA
Trebizond
Erzeroum
Zighana

CONSULAR EXPERIENCES

IN

TURKEY.

BY

COLONEL E. CLAYTON, C.R.A., S.E. District.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 21st January, 1897*).

Major-General Sir Charles Wilson, K.C.B., D.M.E., in the Chair.

The Chairman—Colonel Clayton is so well known in this room that I will ask him to commence his lecture at once.

Colonel Clayton—It may perhaps be as well to begin by a brief description of the main features of the country, as these have considerable bearing upon the political and social conditions of the inhabitants. Description of country Map.

The first important point to notice is that in the immediate neighbourhood of the shores of the Black Sea there stretches a lofty and rugged chain of mountains, the communications across which are scanty and bad, so that the interior is practically cut off from the sea except by a few difficult tracks. The principal of these, within the region of which I propose to treat, is the trunk road from Trebizond to Erzeroum over the Zighana and Kop Passes. An alternative route to this was suggested by a more direct pass reaching the Black Sea at Rizeh, but certainly when I was there no steps had been taken to make this route practicable, and I do not think it at all likely anything has been done since. The next route is up the Chorok Valley, but that is also very difficult. The Trebizond-Erzeroum road is a carriage road, but its state of repair was execrable when I passed over it and I was very glad I was not in a wheeled vehicle.

Behind this coast range of mountains stretches a vast elevated plateau averaging from 4000 to 6000 feet above the sea and forming the regions known as Armenia and Kurdistan. Though I have called it a plateau, only a very small portion of its area is level, but its face consists generally of certain more or less level undulating stretches alternating with hills and mountain ridges and extensive mountainous regions.

Now, speaking in a very roughly generalised manner, it may be said that the lower and more level parts of the country are occupied by Armenians, while the mountains are occupied by Kurds. But this statement must not be pressed too far. There are many Kurdish villages in the plains and many Armenians in the mountains, but, taken in a very general way, it may be accepted as giving a not unfair idea of the distribution of the population.

The general lie of the mountain ranges in the part of the country I am speaking of is this:—The great central range of the Kurdistan mountains stretches in a complicated mass from the Euphrates, in the neighbourhood of Egin, to the Persian frontier, dividing the Armenian plateau from the plains of Syria and Mesopotamia. This chain is the highest and most rugged in the country and its fastnesses are scarcely penetrable. The mountains of Jelu rise to certainly 14,000 feet (Kiepert's map says 15,000) and are rugged and trackless.

North of this great chain there are many groups and chains of minor importance, among the principal of which may be mentioned the great mass of the Bingöl Dagh, south of Erzeroum and a chain running with breaks from the coast range approximately along the line of the present Russian frontier to Ararat, over which range the Pass of Zewin leads from Kars to Erzeroum, a pass which proved so disastrous to the Russians in the last war. Then there is a hilly district east of Van and a range of hills runs also along the Persian frontier and there are many minor ridges and groups. Lastly, most striking features of all are the great volcanic peaks. The Sipan Dagh lifts its solitary cone 7000 feet above the waters of the Lake of Van—the great crater of the Nimroud Dagh, 4 or 5 miles across, closes with its graceful curve the vista of the lake as seen from Van itself—many minor craters with black lava streams meet the traveller as he journeys, while mightiest of all, Mount Ararat itself, soars into the sky at the point where the three Empires of Turkey, Russia and Persia meet.

Between these various mountain groups lie level or gently undulating plains which are the granaries of the country. Among these may be especially mentioned: the valley of the Kara Su about Erzeroum, the district of Khnus, the plain of Mush, the districts of Boulanyk and Melasgird and the country about Arjesh.

Journey to Van.

Having described the general features of the district, I will now ask you to accompany me on some of my journeys through the country, when I will try and bring before you what seem to me the most noteworthy features and incidents that presented themselves.

I arrived at Trebizond from Constantinople by steamer, and on the 3rd July, 1879, started from that place to ride to Erzeroum. From the coast to the Zighana Pass the country is not unlike the subalpine regions of Switzerland, the slopes being covered with forest, with rocks peeping out at intervals, but beyond the coast range the country is bare and at this time of year burnt up and arid. The road crosses first the Zighana Pass and then the Kop Dagh, and is practicable for wheeled traffic, but in very bad order.

I remained at Erzeroum with Major Trotter, H.M. Consul, until the

26th July and then started for Mush, en route for Van. Major Trotter and Dr. Lanzoni, a medical officer in the Turkish service, accompanied me for the first two days. I had bought a couple of bell tents, one for myself and the other for my retainers, and hired horses to carry myself, my men and the baggage.

We first crossed the Palandoken mountains, close behind Erzeroum, and then reached a rolling country covered with grass. We passed in this country several villages of settled Kurds who complained of the depredations of nomad tribes of Kurds and of the venality of the Government officials. The villages are nearly invisible until one rides almost on to the tops of the houses. The villages are built on the slopes of hills. A little of the hillside is cut away, the escarpment forming the back wall of the house, the front and part of the sides being formed of rough stone walls. From the hill to the walls are placed poles to form the roof which is plastered with mud. Thus the buildings scarcely project from the hillside and one might easily ride on to a roof without knowing it.

On the third day from Erzeroum I reached Khnus, the principal place on the fertile plain called after it. The town is built mainly in a ravine with perpendicular walls cut in the plain by a stream and reminded me much of the description of Petra. The ruins of a Genoese castle overlook the place. Here I was hospitably entertained by a Turkish gentleman.

Two days later I reached Mush, the seat of Government of a Mutessarif, or Lieutenant-Governor. Some way out of Mush I was met by a cavalry escort and a deputation of Armenians to invite me to stay at the Bishop's house. Nearer Mush I should think the whole Armenian population turned out to meet me and escorted me to the house.

I remained at Mush four days, receiving and paying visits and hearing much from the Armenians of the sufferings of the villagers at the hands of the Kurds. The mountainous country south of Mush is a very wild region—in fact, it contains Sassoun, where the first of the recent massacres took place. I shall have more to say about this part presently. The Mussulman population of Mush seemed to me more fanatic than in any other place I went to. I have seen nowhere else such scowling looks as I passed through the streets, and on another visit to Mush my Turkish groom narrowly escaped being thrashed for having so far forgotten his religion as to serve a giaour.

On the 4th August I left Mush for Bitlis. The way ran along the foot of the hills over a rich alluvial plain watered by a stream which falls into the Euphrates near Mush. Numerous villages are scattered over this plain, inhabited mostly by Armenians, who had many tales to tell of depredations by the Kurds. The next day, after ascending a ridge which closes the Mush plain on the east, we reached the head of the valley in which Bitlis is situated and in about another hour and a half the town itself, a number of inhabitants and the Kaimakam coming out to meet me. Bitlis is a large town with a ruined Genoese castle, standing very picturesquely on the steep sides of the valley with the stream foaming at the bottom. There was only

a Kaimakan there at this my first visit and he bore a good reputation, but Bitlis was later made into a separate vilayet and a Vali arrived against whom there quickly came many complaints. The American missionaries had a station here and showed me much hospitality and kindness.

On the 11th August I left Bitlis for Van. Ascending the valley for a short time, we then bore off to the right in a north-easterly direction till in the afternoon we reached the crest of the hills bordering the Lake of Van on the south, and I obtained my first sight of that beautiful sheet of water. The view was indeed lovely. We stood on a narrow ridge from which rugged slopes covered with scrub oak dropped several hundred feet to the blue waters, dancing and sparkling in the sun. To the left was the huge crater of the Nimroud Dagh, and to the right of it on the northern shore rose for 7000 feet the symmetrical cone of the Sipan Dagh, capped with whitest snow. To the east, in the direction in which we were going, stretched the ridges on which we were standing, rising and falling and throwing out buttresses into the lake till the mass of the Pelo Dagh blocked the further view. From this point we rode parallel to the lake, sometimes on its shore, sometimes behind the coast ridge, passing several villages, near two of which we encamped for two nights and the third day reached a monastery, over which presides the Catholicos of Aghtamar, one of the leading Armenian ecclesiastics. These monks also possess a monastery on the little island of Aghtamar, containing a curious old church with strange figures carved in bands on the outer walls.

The next day I reached Van, having been as usual met by deputations on the way and was received at the house of the Armenian Bishop.

Description of Van.

Van is a picturesque place. The nucleus is an old walled town nestling at the foot of the isolated limestone rock on which stands the castle. The old town contains the business quarters, bazaars, mosques and Government offices, but the bulk of the population live in an extensive suburb called the gardens, which extends to the eastward for considerably over a mile towards the Warak Dagh, a rugged mountain of igneous rock that rises some 5000 feet above the level of the lake. In these gardens I found that the Pasha had engaged a house for me, and Major Kamsaragan, the Russian Vice-Consul, whom I had met at Erzeroum, had a house just across the street.

On the face of the Castle Rock is a trilingual inscription in cuneiform character cut there by Xerxes, and on other parts of this rock and others in the neighbourhood are several other inscriptions in the same character, but in a different language, and I do not know whether these have yet been satisfactorily deciphered. On some steep rocks north-east of the town stand ruined mounds of unburnt brick, the relics of a very ancient city. These ruins were excavated by Mr. Rassam and myself on the part of the British Museum. They had been previously considerably ransacked by the natives in search of building stone and what else they could find, but we discovered a number of bronze shields covered with embossed images of lions and bulls and surrounded by cuneiform inscriptions. Other bronze objects

were also found and some stone articles and pottery, and a few ivory carvings. Altogether we sent 13 cases to the British Museum.

Life at Van

The general routine of life at Van was something in this way:—The native population goes from the gardens to the city for business in the morning and visitors used often to drop in upon me on their way, even before I had had my breakfast. If I had business with the Pasha I used to ride down to the Konak about 11 o'clock, or else I wrote despatches, etc. In the afternoon, according to season, I either remained at home or went out with my gun in the immediate neighbourhood. One spring I was engaged in building a boat with the assistance of one of the American missionaries in his garden. Then about 4 o'clock, when the people came back from their business, I either received or paid visits, and generally at this time came those who wished to bring complaints or reports of their condition and wants. In the evening I read or wrote if I was at home alone, but Kamsaragan and I often spent the evening at each other's houses.

In summer the heat in the middle of the day is great, but the nights are always fairly cool, on account of the elevation above the sea. The winter is very cold, the thermometer ranging to 10° or 12° below zero and there is deep snow for some four months during which communication with the rest of the country is almost cut off and even the weekly mail from Constantinople was very irregular.

Famine.

The winter and spring before my arrival in the country there had been a great scarcity of snow and rain, and as no rain at all falls in the summer months, the fate of the crops depends upon the abundance of snow in the winter and rain in the spring. Consequently there was a great failure of crops this year and a severe famine in parts of the country. Lady Strangford exerted herself most generously to collect funds in England for the relief of this famine, a part of which were entrusted to me to administer. The difficulties, however, in dealing with the distress were very great on account of the difficulties of transport. It was generally possible to obtain corn from the plains west of the Lake of Van, though at a high price, but the difficulty was to convey it to the parts where the most distress was. Only pack transport could traverse the routes and a large proportion of the beasts in the distressed parts had either died of starvation or been eaten. The American missionaries were most generous with their help and provided trustworthy agents from their congregations. We therefore managed to convey a certain amount of corn into the distressed districts. A soup-kitchen was also established in Van for the refugees who came in, and I made several journeys through different parts of the country and distributed money in places where it was found that the inhabitants could procure food if they had the means. But in spite of all that could be done, the loss of life was certainly great. The refugees who came in had had their health so undermined by privation and the indigestible substances they had been driven to eat, that the wholesome food, when they got it, did not seem to be able to restore them and a considerable proportion died. Altogether I don't think the mortality in the regions with which I had to deal could have been much below 10,000.

Travelling: Winter. Travelling in winter is very difficult. In January 1880 I went to Bashkala. The distance is only about 60 miles, but it took me four days. Progress through the snow was slow and a pass about 10,000 feet high had to be crossed where the horses plunged often to their girths in the soft snow. One baggage animal broke his leg and had to be destroyed. In winter it is of course impossible to sleep in tents and we had to content ourselves with what accommodation the villages afforded. Some of these had a regular guest-chamber, but this was not always the case. At a village called Chugh, on this trip, Dr. Raynolds, one of the American missionaries who was with me, and I occupied a corner in the large house-room of the headman. In this one room lived six families of the headman and his brothers, 50 persons, men, women and children in all. The weird scene at night—this large sort of domed room, lighted principally by the flickering flames of a fire in the centre, with the deep shadows and the multitude of figures flitting about—can be better imagined than described. At other places I have occupied a raised platform at one corner of a stable, with the only opening besides the door a hole in the roof, which I had the greatest difficulty in preventing being closed up at night by a sod.

On this journey I heard grievous accounts of the straits caused by the scarcity. The headman of Chugh could only give his family bread once a day. Poor people had been driven to eat roots and grass; others had killed and salted their cattle. This diet was causing disease and the loss of their cattle prevented them from cultivating their land, so that when the meat came to an end they would have nothing left. I was shown some of the bread to which the people were to a great extent reduced. This was formed in round cakes as hard as a stone and of a greenish-black colour. It seemed to me to consist of a mixture of husks, perhaps grass, a little linseed and a good deal of grit. It must have been fearfully unwholesome and indigestible with very little nourishment in it.

Whilst at Bashkala on this occasion I visited the prisons in which were upwards of 60 prisoners, all Kurds confined for robbery. These prisons were terrible places. In the first building I went to there were 35 men in a room about 15 feet square, very hot and stuffy with only a hole in the roof for light and air. One man was lying with his toes rotting off from frost-bite, he having tried to escape whilst being taken to prison. There was also another sick man. At the Government offices were two other rooms with better air, but very dark and rather cold. The prisoners complained of having been kept three days without food. I recommended that the sick should be separated from the rest. Of course the state of things sounds horrible, but it must be remembered that it was really not much worse than the way in which they live at home in their own villages.

Travelling Summer. Travelling in summer is delightful. I always took tents, so that I was independent, though I on occasions availed myself of hospitality which was generously offered to me.

In June 1880 I went to Sert to meet Major Trotter by a route new,

I believe, to Europeans. Instead of going the usual way, *viâ* Bitlis, I struck from the south-eastern angle of the Lake of Van into the mountains. Crossing a low ridge, we entered a valley running in a south-westerly direction. A curious feature of the formation of the country south of the Lake of Van is the rivers that have their rise within a mile or two of the lake, but run away from it.

We followed this valley down through scenery reminding one strongly of parts of Switzerland. The valley was shut in by steep rocky mountains covered in part with forest and, where lateral valleys came in, glimpses could be obtained of higher mountains in the background—at this time of year carrying much snow on their higher shoulders.

At one place where the river makes a sharp bend to the east, we left it for a time and crossed a ridge to the village of Karasu, lying in a small plain among the hills. Here I was very hospitably entertained by Salih Bey, a Kurdish chief, who gave up to me a separate Kiosk in his grounds.

The next day we crossed a low ridge into a most romantic valley. Below us lay the valley, its undulating surface looking like an English park with clumps of trees scattered over green swells. The path ran between hedges bright with roses and other flowers, sparkling streams dashed and foamed over rocky beds, while on the opposite side of the valley rose dark, rocky mountains streaked with snow. In this valley stood the Tekié or monastery of Sheikh Jelaleddin, the great chief and holy man of these parts. We were not allowed to see him, but I was much surprised at seeing, by his out-buildings, a great pile of red draining tiles. How they got there I cannot imagine. I fancy, however, that, though a bigoted Mussulman, Sheikh Jelaleddin must be in some ways progressive, for the paths in this part of the country are far better than any others that I met with, in spite of the natural difficulties, and this was said to be the work of the Sheikh.

From this valley we again reached the course of our former river and followed a path high up on its right bank, the river itself plunging through fine ravines. In one place the path is carried by a convenient ledge on a rock face with, for 1000 feet above and 1500 below, no possibility of passing. There seems to be plenty of game in this country, for on this day I saw a herd of deer, my men saw two bears, and when we encamped at night we saw numerous fires about the hill-sides, which, the men said, were lighted by the villagers watching to keep off wolves and wild swine.

The next day we got out of the mountains into more open country and the following day reached Sert about mid-day. Here I met Major Trotter and three days later started to return with him to Van, *viâ* Bitlis.

From Sert to Bitlis runs a great trade route, being the principal passage across the Kurdistan mountains from the Syrian plains to the Armenian highlands. It is also interesting as being the last stage on which it is possible to clearly trace the route of the Ten Thousand Greeks under Xenophon.

From the battle-field of Cunaxa we can trace them step by step to the passage of the Centrites River, now the Bohtan Su, near Sert, where they met with resistance from the Carduchi or Kurds. They continued their march northwards, presumably by the valleys leading towards Bitlis, but after this point their wanderings cannot be clearly traced. They seem to have spent an inordinate time, in the first place, before they reached the Euphrates and, again after that, before they came in sight of the Black Sea and, as far as I am aware, their route in the interval has never been accurately made out. If they passed through Bitlis, it seems very strange that Xenophon makes no mention whatever of the Lake of Van. It is true that the route from Bitlis to the plain of Mush does not actually pass within sight of the lake, but when on the Rahwan, as the plateau is now termed, lying at the head of the Bitlis Valley and between the Lake of Van and the plain of Mush, a distinct and broad gap is seen on the east between the mountains, and a divergence of a very short distance from the route would bring a man over the crest of the plateau in sight of the lake, and one would have expected the Greeks to have had flankers out, who, one would think, could not possibly have failed to see the water.

I formed on the spot a theory to account for the formation of the Lake of Van and, I think, it would be very interesting if any future travellers would examine the case and either verify or overthrow the theory. My theory is that originally the basin now occupied by the lake was drained into the Euphrates through the plain of Mush and that the barrier of the Rahwan that now shuts in the waters was formed by an outflow of lava from the great volcano lying to the north. My reasons are these:—The plain of Mush lies about 1000 feet below the present level of the lake and is now drained only by an insignificant stream rising in the slopes of the Rahwan. From Van, when one looks towards the west end of the lake, the barrier of the Rahwan, which is only some 400 feet above the lake, disappears on account of the curvature of the earth and a gap is seen with a water horizon, which looks obtrusively like the line of drainage. Lastly, the Rahwan, as far as I could observe, consists entirely of lava.

From this digression I will return to our journeyings. The route from Sert to Bitlis, although such an important line of trade, is a shockingly bad road. I have taken two different ways between the two places and in both the passage of baggage animals was exceedingly difficult in many places and I declined to ride myself, but walked and led my horse at these spots. We took three days from Sert to Bitlis and on the second night we camped about a quarter of a mile from Olek, a Kurdish village. As we sat in our tent just after dinner we were aware of a great noise, apparently arguing and shouting and a wailing of women. We went out to see what was the matter and found that a quarrel had arisen in the village and a man had been stabbed. His wife and mother had insisted on loading the wounded man on a donkey and bringing him to our camp. He looked very bad; he had been stabbed in the back between the shoulders and was apparently in a state of collapse. The wound was not bleeding out-

wardly, but had a ghastly blue look. As there was no outward bleeding, we could do nothing for him, but with great difficulty persuaded his womankind to take him home and put him quietly to bed. We fully expected to hear next day that he was dead, but to our intense astonishment on our way into Bitlis we overtook him, supported on a horse being taken by his wife and mother to Bitlis to lay a complaint before the authorities and get damages against his assailant. As far as we could make out they did not much care if he died, so long as they could get substantial damages.

I may make some mention of a journey I took to visit the great Kurdish Sheikh Obeydullah, who dwelt in the mountain fastnesses near the Persian frontier and who was a very turbulent subject of the Porte. I received instructions to visit him if possible and see what was the real state of the case with regard to him. I did not obtain from those I consulted much encouragement as to my chances of getting to see him, as he was said to be much too holy a man to allow any infidel to see his face. However, as I wished to distribute some famine relief in the district of Gevver, beyond Bashkala, which was in the direction of Obeydullah's residence, I determined to go that way and see what events would bring forth.

Visit to Sheikh Obeydullah Mar Shimoun.

Sure enough, one day a messenger from the Sheikh came into my camp and said that the Sheikh had heard I was in the neighbourhood and would be very pleased if I would pay him a visit. Of course I said I should be glad to do so. The route from Bashkala to Neri, the Sheikh's village lies nearly parallel to the line of hills forming the Persian frontier and close to their foot. The frontier was much infested by a marauding tribe of Kurds called the Shikaks, who plundered impartially on both sides, taking refuge either in Persia or Turkey, according to whether the Turkish or Persian authorities were endeavouring to punish them. The tribe had been armed by the Turks with breech-loading rifles during the Russo-Turkish War and they still retained them, so that they were a formidable body. The day I left Bashkala, just as I was on the point of starting, some business turned up which I had to wait to see about, so I sent my baggage on with my servants and one zaptieh, intending to follow shortly with my dragoman and the other zaptieh. I was delayed longer than I expected, so that the baggage got several miles ahead. As I came down to the bridge by which the Zab was to be crossed, my zaptieh said he had seen a party of mounted Kurds, presumably Shikaks, on the road ahead. On hearing this I was very much afraid they might have plundered my baggage, as I had a large sum of money in my portmanteau for famine relief. I accordingly galloped on to try and find out what had happened. On rounding a spur of hills we came in sight of the band of about 20, who immediately turned up a valley towards the frontier. I then, followed by the zaptieh, turned over the spur to the left to try and intercept them the other side. On reaching the crest of the hill we found them going slowly up the hollow beyond, I stopped and called to them to speak to me. But they scattered on to the hillside and commenced to fire. My zaptieh returned their fire

in spite of my endeavours to stop him and, as every attempt I made to approach them caused a renewal of their fire, and some of their bullets come too close to be pleasant, and I saw no signs of the plunder of my baggage, I halted and let them go off and then resumed my original road. A little way on we came to a party of villagers who had just been robbed by these Shikaks and stripped to their under-garments. I gave them some assistance, for which they thought themselves in very good luck, and on reaching the village where we were to encamp, I was right glad to see my tents pitched all safe, the baggage-train not having been fallen in with by the Kurds.

Neri, Sheikh Obeydullah's village, lies in a deep valley in the mountains south of the plain of Gevver. Gevver is, without doubt, the dried bed of an ancient lake. The soil is a deep alluvium, very fertile where sufficiently dried, but a considerable portion of the surface is still occupied by swamps and morass. Here we suffered from clouds of the most bloodthirsty flies, like very large house-flies, with grey bodies and metallic green heads. I rode a white horse and at the end of the day he looked as if he had been in the thick of a battle, covered with blood that had flowed from the bites of these flies. As we approached the end of the plain nearest to Neri, we came into a region where the villagers told us that they were entirely in the hands of the Sheikh, that they paid tribute to him, but not to the Turkish Government.

On leaving the plain of Gevver we passed into the mountains and, crossing two ridges, arrived at Neri, a large village very finely situated among fig-trees and forests in the bottom of a narrow valley surrounded by high mountains of picturesque form. The Sheikh had sent his tribe out to meet me and I was accommodated in a very large, handsome room in the Sheikh's own house. One side of the room consisted entirely of glass sashes opening on to a verandah, the place being very hot, at all events in summer, and the floor was covered by a magnificent Persian carpet of very large size.

Here I was visited first by the Sheikh's Khalifé or Minister and by the Turkish Mudir, whom the Sheikh permitted to reside in the village, though without any authority, and afterwards by the Sheikh himself. He seemed in very delicate health and was dressed entirely in white. His Khalifé, Sheikh Hamid, struck me as an exceedingly able man.

The next day I paid a visit to Sheikh Obeydullah in his own room and was amused to see an iron French bedstead. The Sheikh was evidently anxious for the friendship of England and said he had correspondents in India who spoke well of the English rule there. It was evident that he aspired to become ruler of a principality independent of the Turkish and Persian Governments.

His further history was briefly this:—The following year he collected Kurdish tribes to the number of about 20,000 and invaded Persia. He swept over the country almost to the gates of Tabreez, plundering and exacting contributions, but then appeared the universal weakness of all such Kurdish levies. Having got as much plunder as they could conveniently carry, and Persian regular troops coming on to the scene,

the Kurds thought it time to go home and the whole force rapidly melted away and dispersed. Next year the Turkish Government somehow induced Sheikh Obeydullah to go to Constantinople, whence he was ultimately deported to the Red Sea and there died.

Visit to Mar Shimoun.

From Sheikh Obeydullah I proceeded on a visit to Mar Shimoun, the Patriarch of the Nestorians, who lives at a village called Kochannes, which lies on a small tributary of the Zab, in the mountains near Julamerik and close to the entrance to the almost impenetrable district of Tiyari, where certain Nestorian communities maintain themselves in prosperity and practical independence, neither Turkish officials and troops nor Kurds being able to penetrate the country.

Returning over the plain of Gevver to Diza, the seat of the Kaimakam of the district, we turned westward from there and on the second day from Diza reached Kochannes very finely situated among groves of trees on a shelf in a narrow valley hemmed in by rocky heights.

Mar Shimoun received us hospitably and I pitched my camp in one of the groves of trees near a babbling stream and a waterfall. The village lies about 7000 feet above the sea and the trees, mountain air and water were most refreshing after the stifling plain of Gevver.

Mar Shimoun was then a man of about 30. The title is always borne by the Nestorian Patriarch, who is both political and religious head of the nation, if it may be so called. The succession is peculiar. Mar Shimoun is not permitted to marry, but the office is hereditary in his family and when I was there his nephew, a youth of about 18, was being brought up to succeed him. The system is naturally not always productive of good results. The present holder did not bear a very good moral character and his authority was by no means secure over his people, and his nephew, who had nothing to do but dress gorgeously and swagger about, seemed in a fair way to be spoilt.

I arrived at Kochannes on Thursday and remained till Monday. On Saturday I rode over to Julamerik to call on the Kaimakam. We had to cross the ridge south of the Kochannes Valley between it and the Zab Valley and from the summit had a splendid view of the Jelu mountains, the highest in any part that I visited. They rose just beyond the deep trench of the Zab Valley some 3000 feet lower than the ridge on which we stood and lifted themselves some 5000 or 6000 feet above our standing point.

On Sunday I attended service in the church at Kochannes, a small, very plain building of stone, standing on an isolated rock. The door was so low that one had almost to crawl in. The service was very plain indeed, a great contrast to those of the Armenian Church, which resemble much those of the Greek Church in their ornateness and in the robes of the priests, though, I believe, the actual liturgy is quite different.

One afternoon Mar Shimoun organized a bear hunt. The hillside opposite Kochannes was covered with scrub oak, so a certain number of sportsmen with guns climbed about half way up and then we spread ourselves out and hid ourselves in the scrub at the edge of an open belt,

while the wood was beaten towards us. A bear was soon on foot, but some one in our line fired a shot and the bear broke back through the line of beaters without coming out into the open.

On my way back to Van from Kochannes I met Mr. Rassam on his way from Nineveh to Van, to finish the excavations of the old city which I had begun. He had spent the previous night in the encampment of the Hartushi Kurds, one of the great nomad tribes. The chief of this tribe had told him that he wished very much to be reconciled with the Tiyari Nestorians with whom he had a feud, as their hostility forced his tribe to make a long detour on their way from their winter to their summer pasturages. Mr. Rassam said he expected to meet me and would ask me to try and arrange matters. I accordingly turned back to the Kurdish camp, where I was received by Hajji Agha, the chief, a very fine-looking young man over 6 feet in height. I spent the night in his camp, very picturesque with the large black tents of camel hair and, having talked over the matter with him, I decided to return to Kochannes and get Mar Shimoun to send for the headmen of Tiyari, so as to try and effect the reconciliation. Unfortunately the Tiyari Nestorians were at strong variance with Mar Shimoun and refused to obey his summons, so that, after waiting several days, I had to return to Van without having made peace. I heard afterwards that the Tiyari men were very sorry they had not come.

Journey through Sassoun.

I may mention one more journey, as it led through Sassoun where the first of the recent massacres took place and some of the incidents throw a light on the state of the country.

I had gone to Sert, *viâ* Bitlis, and I wished to get to Mush without retracing my steps through Bitlis. The people of Sert said it would not be possible to get through that part of the country, it was so wild, but, if I wished it strongly, I had better go to the Pasha who was encamped three days off at the foot of the mountains. He was an old friend of mine, so I willingly adopted this course. I found him encamped with a small military force in a delightful spot. His tent was pitched in a grove of trees in a valley between fine hills and a small stream ran in front of the tent and had been dug out to form a small pool. It was delightfully cool after the terrific heat of Sert and the journey thence. The Pasha said there would be no difficulty in my getting to Mush, he would send two troopers with me and tell the chief of the neighbouring Kurdish village to send twenty of his men in addition for the first day's journey with letters to the chiefs of the two villages, where I should have to sleep on the way, to tell them to send an escort of their men each for a day's journey. I stayed a couple of days with the Pasha and then set out. The way was very difficult, through high mountains, the path in many places being a mere shelf about a couple of feet wide in an almost precipitous hillside and with very steep, rugged pitches in other places, up which one could only just manage to drag the loaded horses. We passed several villages on the way, looking better than most of those in this country, for the houses were neatly built of stone and were surrounded by trees and

green plots wherever a level spot could be found on the steep hillsides. These green plots stood out sharply from the prevailing red colour of the soil in this neighbourhood.

When we reached Jemilan, the village where we were to stay the first night, we were very civilly received by the chief, a stately old man with a long white beard. But the Kurds who had been my escort came to me about sundown, and said that they had been invited to sleep in the village, but they dared not do so for fear of being murdered and begged that I would allow them to sleep round my tent under my protection. The Mudir of Gawar also, who was to have come with us, cried off, as he was afraid to stay the night at this village, where he had been shot at once previously.

The old Agha said that all the Kurdish tribes were at enmity with one another and no one could safely leave his own particular valley.

The next day I went on with another escort from this village, but about mid-day the leader of them came to me and said they dare not go any further, that there were nomad Kurds in the hills in front and that, though they were safe whilst with me, they would be set upon when they turned back. As it was evident that an escort who had these ideas was of little use, I sent them home and went on with my two troopers only. The next night we camped in the main valley of Shattak and heard many stories of the depredations of the nomad Bekiranli Kurds and of the misery of the Armenian villagers, who said they were practically the slaves of the neighbouring Kurdish Aghas, who even sold them among themselves. That night we kept watch all night, but were not disturbed.

The next day on our way to Mush the chief of the Bekiranli met us with two or three attendants. He said that the Government were going to send troops against his people to drive them away. I told him that if this was the case the cause was the bad behaviour of his people, and the way they plundered and robbed and that I advised them now to go quietly home and if they wanted to come again another season to promise to behave properly and to keep their promise. This Kurd was certainly a most truculent scoundrel in appearance, worse than any other I ever met. Many of the Kurdish chiefs I came across were fine-looking men, with excellent manners and no signs of such ferocity or fanaticism as would prevent them from living at peace with their neighbours, whether Moslems or Christians, if the Government were only firm and just and the officials honest.

Condition of the country.

I may perhaps be allowed to indicate in a few words what appeared to me to be the condition of the country and the principal evils under which it suffered. The country is naturally rich. There is much fertile land, though somewhat depending for its crops on the seasons, so that lack of rain sometimes produces scarcity or famine. If the country were more settled a more extended use of artificial irrigation might however be possibly introduced. It is already carried on in many places. In addition to its agricultural wealth, there is abundant pasture on the mountains in summer and, I believe, also con-

siderable mineral wealth, though this has been only very partially explored at present.

Unfortunately the country is, I fear, getting poorer and poorer. The insecurity of property prevents enterprise and when I was in the country the amount of land under cultivation was steadily diminishing, the peasantry thinking it useless to grow crops from which they derived so little advantage, owing to the depredations of Kurds and the rapacity of officials and a continual exodus was taking place of population to safer regions.

Evils. Some of the principal evils weigh on all the population alike, whether Moslems or Christians and others are suffered by the Christians alone.

In the first category may be placed :—

First.—The inordinate demands for money from Constantinople, so that all the revenue which can be squeezed out of the country that does not stick in the hands of the collectors goes out of it and the very minimum is available for local purposes. Therefore all the officials and troops are underpaid or not paid at all and can only live by oppression and corruption.

Secondly.—The rapacity and venality of the officials. This is partly due to the cause just stated, but is much greater than can be fairly all attributed to that cause. The tenure of office of every official is precarious and has often been obtained by large bribes to the dispensers of patronage, either at Constantinople or in the provinces and therefore the main object of almost every official is first to recoup himself for the bribes he has given and next to get as much as he can out of his office whilst he holds it.

Thirdly.—Due to these causes to a great extent is the third evil, that the Government takes little pains to keep order. If a Kurdish tribe makes a raid upon another or on an Armenian settlement it is much easier and more profitable to make them pay a sum of hush-money than to punish them and so lawlessness in unchecked.

But, besides these evils from which the whole population suffers, there are others which fall only on the Christians.

In the first place, Christians are not allowed to possess arms, whereas all the Moslems are armed to the teeth and the Christians are therefore helpless against Kurdish raids.

Secondly, it is very difficult, if not impossible, for a Christian to obtain justice in any dispute with a Moslem. Christian evidence is usually not admitted and courts and judges are hostile to them.

And lastly, independent of the general prejudice against the Christians, I believe myself that the Turkish Government has a deliberate policy of repression of the Christians. They are well aware that the Christians, especially the Armenians, are progressive and enterprising and they are afraid of their advancing and getting too powerful if they are not continually kept down and they are therefore well pleased to see them harrassed and plundered and give indirect, if not direct, encouragement to Kurds, troops and officials to do so.

Reforms.

The line which reforms should take is pretty clearly indicated by the nature of the evils.

Firstly.—Regular payment of officials and troops. At first it is doubtful of the existing revenues would suffice for this and a loan might be necessary, but if tranquility and honesty were really established the wealth of the country would assuredly increase rapidly, so that revenue and expenditure could be balanced.

Secondly.—A better system of appointing officials and more security of tenure of appointments.

Thirdly.—Adequate security for justice to Christians. It must be confessed that this is a very difficult condition to secure.

A re-organization of and admission of Christians to the gendarmerie would be a salutary measure. Also the appointment of Christian assistants to the governors and it would no doubt be a most desirable thing if the peoples in the Turkish Empire could work out their own amelioration without interference from outside. And this might possibly be done if it could be assured that the Central Government would give them fair play and really seek reform without *arrière pensée*. But I confess I am very sceptical as to the realization of this condition and I very much fear that the appointment of native Christians as assistant governors will not produce the salutary effects hoped from the measure. There was a Christian Mouavin at Van when I was there, but he was powerless, and I think that in most cases it will be found that they will be unable to produce much good effect, for they will be entirely subordinate to the superior Moslem authorities and will be able to exert but little influence. There will be moreover the difficulty of ensuring the appointment of men of sufficient character to resist the evil influences and temptations with which they will be surrounded.

On the whole I am not very sanguine about any real amelioration of the existing state of things, without European supervision on the spot, for a time at all events.

I will only say, in conclusion, that the country is a magnificent one, in climate, soil, and scenery and deeply interesting in its history and its remains. Its inhabitants also, in spite of many faults, aroused my sympathy and I may say my affection. I include those of all races—Armenians, Turks, Nestorians and Kurds—and I can only hope and pray that a future may be reached for it as prosperous and happy as there is full scope for in its natural capabilities and situation.

DISCUSSION.

The Chairman—General Maurice, ladies and gentlemen, before asking you to return thanks to Colonel Clayton for his very interesting lecture, I should wish to say a few words with regard to the country, though I have no personal knowledge of it. My experience relates to the western districts.

The country described by Colonel Clayton is really a continuation of the great Persian plateau which extends, at a lower level, to the shores of the Ægean Sea. The rise to the higher plateau is marked by the hills to the east of Sivas, which

run down from the vicinity of Zara to Gulek Boghaz (Cilician Gates),—the great pass from the coast plain of Cilicia to the interior of Asia Minor. The character of Western Anatolia is quite different from that of the eastern district which Colonel Clayton has described. A large portion of the plateau is a dead, level plain with a salt lake in the centre.

The country represented on the map is one of great historic interest, for through it, during the long struggle between the east and the west, invading armies have frequently marched. It has also been the scene of some of the decisive battles of the world. Near Melasgerd, to the north of Lake Van, was fought the great battle in which the Seljúk Turks, under Alp Arslán, defeated and made prisoner the Byzantine Emperor, Romanus Diogenes (A.D. 1171). As a result, the Seljúk Turks over-ran Asia Minor, and established the Seljúk Empire of Rúm, with its capital, first at Nicaea (*Isnik*), and then at Iconium (*Konia*).

Then to the west, in the passes leading from Erzerúm to Erzingan, Ala ed-Dín, the Seljúk of Rúm, defeated Jelal ed-Dín, the Shah of Kharezm (A.D. 1229) and broke up the Kharezmian Empire which, at one time, threatened to extend its limits to the Ægean. A little further west, near Erzingan, the Mongols defeated Ghiyas ed-Dín, the Sultan of Rúm (A.D. 1243), who became tributary to Kuyúk Khán. Through the same district Timúr marched westward to the conquest of Sultan Bayezid I. (A.D. 1402), and, in the following century, Sultan Selim I. marched eastward to defeat Shah Ismail near Khoi and enter Tabríz in triumph. The later Turco-Russian campaigns in the same district are no doubt well known to you. The country through which these armies have passed, following one of the great lines of communication between the east and the west, is not only historically interesting, but may be of great military importance in the future.

Then the present inhabitants are in themselves extremely interesting, and the causes which have led to their existing distribution and to their peculiar relations to each other are no less so. The Armenians and the Kurds, for instance, are of kindred race, and I believe that the Kurds have been longer in the country, at any rate in the mountain districts, than the Armenians. If you read closely Xenophon's narrative of the "March of the Ten Thousand" you will find that, after seven days' constant fighting, with the Curduchi (Kurds) the Greeks crossed the Bohtan Su, which was then the boundary of the Persian Satrapy of Armenia. They then reached the Armenian villages on the plateau, and after a few days' march entered the mountains to the north, apparently near Melasgerd. Here they saw the last of the Armenians and entered a district peopled by a number of different tribes. The origin of the present distribution of the population is remarkable and dates from the time of the Arab, Seljúk, Turk, and Mongol invasions, and especially from that of Timúr. The Nestorians, who Colonel Clayton has described, and whose religious chief he visited, call themselves Syrians, and are really the descendants of the old Aramaean population of Mesopotamia. They were driven into the mountains by the encroachments of the nomads, and by the terrible massacres of Timúr, who almost exterminated them. The nomads, with their countless flocks and herds, when they entered the rich plains of Mesopotamia destroyed everything as they passed. They cared nothing for civilization or for town life. Their one thought was to depopulate the districts they traversed and convert them into pasture grounds. The result was that one of the richest and most fertile districts of the earth was laid waste and irretrievably ruined. One section of the inhabitants, represented by the Nestorian tribes Tiyari and Choma, became and remains nomad, whilst another conquered a position for itself in the Kurdish mountains where it still maintains itself in the midst of a hostile or unfriendly population. Exactly the same thing, although

under different conditions and not to the same extent, occurred in the northern part of the country. The nomads over-ran the fertile valleys of Armenia, eating up everything as they passed; but, in this case, instead of remaining permanently in the country in large numbers, they swept onward to the richer districts of Western Anatolia. As in Mesopotamia, the butcheries of Timúr drove many of the Armenian inhabitants of the valleys to take refuge in the mountains. But, instead of occupying a compact district as the Nestorians did, they settled down in scattered villages under the protection of different Kurdish tribes, to whom they paid tribute. This tribute was paid in many districts until a comparatively recent period, and one of the original causes of the late disturbances appears to have been partly due to it. The Turks, during the last forty or fifty years, have been gradually bringing the mountain districts under control and levying taxes on them. The unfortunate Armenians have been called upon to pay both Kurds and Turks and, being unable to do so, have in places resisted the Kurds who they thought were losing their power. But the people are so intermingled that it is difficult to find out exactly what their relations really are. There are two great evils from which the people suffer to which I do not think Colonel Clayton has alluded. One is the irregularity in the registration of land. The land registers are in a terrible state of disorder. I know of no country in which they are so badly kept. Many of the titles are bad and there is much cheating and oppression of small land-owners. Another very fertile source of disorder, at any rate in that part of the country that I was in, is the money-lender. Nearly all the peasantry in the districts round Sivas are in debt to the Armenian pedlars and money-lenders and, of course, when an Armenian pedlar presses for payment in a Moslem village there is generally a row. A great many local disturbances are due to this cause.

I will not detain you longer, but I will ask you to give a cordial vote of thanks to Colonel Clayton for his lecture. I have listened to it with very great interest, as I know what Colonel Clayton did when he was Vice-Consul at Van, and that he has a wide experience of the country and people which he has so ably described (applause).

General Maurice—I am sure, ladies and gentlemen, we shall all wish to offer a vote of thanks to Sir Charles Wilson both for his great kindness in coming here at all, and also for the very interesting speech he has made to us now that he has come (applause).

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A CRUISING VISIT

TO SOME

GERMAN BATTLE-FIELDS.

BY

POULTNEY BIGELOW

(Author of "The German Struggle for Liberty (1806–1815.")

(A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 4th Feb., 1897.)

COLONEL C. C. TRENCH IN THE CHAIR.

MR. POULTNEY BIGELOW—Colonel Trench, ladies and gentlemen, when I drew this picture on the wall, to which I must plead guilty, I was all alone in the room except my excellent friend Major Abdy, and I thought it was a very fine picture; but since coming back to it with so many eyes upon it I am a little afraid of it—it looks explosive—but it will have to do duty this evening to enable me to explain the scientific lecture I am about to embark upon. I simply wish to illustrate by this sketch what a necessary article is a canoe in exploring the countries of Europe for purposes of history. My canoe "Caribee," which I have here tried to picture, is 15 feet long; it has a sleeping well 7 feet long where one can sleep very comfortably by throwing down a coat or a blanket and wrapping up one's boots for a pillow; and there is a little tent which can be spread between the masts. I carry a spirit lamp and a few articles of stores which do not take up any more room than what goes into a soldier's knapsack. The front compartment is watertight, and the other one also, to within $3\frac{1}{2}$ feet of the stem and stern, and a little kindling wood is carried in the front compartment in case of having to camp of a wet evening. In the after locker I keep the bedding and all things of that sort in case of a capsize. The little sails here are purely auxiliary. The little fan centerboard of brass takes up no room when it is folded up and it drops perhaps quicker below the keel. The whole boat only weighs 80 lbs., so that it is easily carried on one man's back for short distances, the contents constituting a second load. This little boat

has carried me and my maps in a great many countries of the old and new world, and always in the most successful way. A great advantage of that boat springs from the fact that in nearly every country of Europe there are a large number of officials, principally policemen, who make it a business to enquire what the stranger is doing, and it is an enormous convenience to have a little boat that slips along and leaves no trail. A little craft of that kind puzzles them in the beginning and by the time they have solved the puzzle the boat has gone somewhere else and it is no more their business to enquire what it is. It is an exceedingly valuable boat in that respect. One does not camp until twilight comes on and then one always selects a little open spot above the village, not below it, and no one is notified, and the next morning you cook your coffee between your knees as you float away in the dawn of another day.

This peculiar trip that I am speaking of now was started from the head waters of the Elbe, which is really not the Elbe, but the Moldau. The Elbe runs through the heart of Germany from the top of Bohemia to Hamburg. I shipped the boat by rail from Flushing up to the head waters at Budweis. It is astonishing how little it costs to send a boat of that size half way across Europe. I think it was a matter of 10s. or 12s. The German railways have a very convenient and kind way of charging, only by weight and not by cubic contents as the railways do here, which makes an enormous difference. I found it at Budweis in good condition and I started down towards Prague.

Bohemia is to-day a battle-field of races; it is more insufferable than the most insufferable part of the Transvaal. If you speak to the Germans you are insulted by the Czechs. I have never met anybody who could talk Czech. I do not know what the effect of speaking Czech among the Germans would be, but I found after my first day's experience it was safer to begin with Dutch or English, or anything like that, and to work up very slowly and carefully to the German.

Prague was a place of great interest to me, because it was there that Scharnhorst died. Scharnhorst is, I suppose, now universally recognised as the author of the universal service in the army. He was the man who contributed, perhaps more than any other single man, to making Prussia capable of rising against Napoleon, uniting all her forces, civil and military, against an enemy who seemed at that time unconquerable. He was a simple, modest, scholarly man—one would have said a most unsoldierly-looking man. He was not a Prussian, and it may be interesting to recall that not a single one of the great men who made Prussia a military power was a Prussian, they were, every one of them, from non-Prussian countries. Scharnhorst was a Hanoverian; Gneisenau was an Austrian subject; Blucher was a Mecklenburger and saw his first service in the Swedish army; the great Prime Minister Stein was from Nassau; and Hardenberg, the Prime Minister who succeeded him, was a Hanoverian. But Blücher and Gneisenau and Scharnhorst, the three greatest generals of that time were not one of them Prussians.

In Prague I went to see where Scharnhorst had died and I assumed that every boy in the streets would be as familiar with Scharnhorst,

who had saved Austria as well as Germany from Napoleon, as a boy here would be with Wellington and Nelson, but I could find no one of the average class of men who had ever heard of Scharnhorst, and it was only when I was, by my host, introduced to a professor at the Prague University, that my efforts were successful. He told me where Scharnhorst had died in Prague, and I went to the house and climbed upstairs and rang the bell. A very stout lady came out, and I asked her to excuse my apparent presumption in calling upon her, but could she tell me if Scharnhorst had died here. She told me rather surprisingly that there was no such lodger in the house and that I had made a mistake. So I went downstairs and my professor friend was waiting for me downstairs—he was actually afraid to come up—he was a German and the house was Czech. He told me he was quite sure it was the place and that I had rung at the right door. So that is as far as I got in trying to pay my respects to the memory of that great man in Prague.

That recalls to me a trip that I made in another direction. Perhaps I ought to say first that the scenery from the head waters of the Moldau down to Prague is magnificently wild. The peasants there are equally wild, but not magnificent. The principal life is connected with taking rafts down the river. There are many rapids and a few weirs. Sometimes you can shoot them in the canoe. I shot some, but I shot one too many. I smashed the rear part of my boat and I had to make a raft trip of it for two days, which was very interesting, living with the men and hearing about their life and adventures.

From Prague I paddled down to where there is a little town about three or four miles from the battle-field of Kulm. That battle, as you will all remember, was the sequel to the famous battles round about Dresden, where Napoleon smashed the allies completely in the summer of 1813, and where Napoleon followed his victory up as far as the little town of Pirna, which is a short way above Dresden. And there he had one of those violent attacks upon his digestive apparatus, the result of his most extraordinary gluttony, and had to turn back, leaving Vandamme to follow over the mountains. Well, Vandamme had engaged the Austrian and Russian army near Kulm, and apparently was doing very well, though the allies held their own fairly well. He was expecting momentarily reinforcements which had been promised by Napoleon, when suddenly over the brow of the mountains appeared blue coats, and there was a great hurrah and cheering amongst the Frenchmen and they attacked with redoubled energy; but instead of Frenchmen they turned out to be Prussians under Kleist. This Prussian general received his later title from Nollendorf, and a splendid monument near the palace in Berlin, by reason of having stumbled upon this place near to Kulm without having the vaguest idea that he was going to meet there anything but disaster. He was riding along with one or two of his adjutants, and with tears in his voice he begged them to tell a fair story of his disaster, saying to them: "I know this will be a disgraceful day, but do speak the truth and say I did my duty as a soldier;" and he supposed of course that he was about to be smashed entirely. Instead of that it was *his* presence which demoralised the

French and made him the hero of the battle of Kulm, a reward which he had not deserved. He was most surprised. That illustrates the many surprises there are in war, as in love.

Kulm is the first place that the canoe reached on coming down the Elbe, and it is one of the most historical places in connection with the war of the Prussians in the year 1813 against Napoleon. It is a very easy run from the river where you can get a trap for the excursion. There is a castle at Kulm where Vandamme had his head-quarters. I wished very much to see this castle, it was a notable place and I heard that there were some very interesting historical collections there, and I thought that by sending in my card, fortified by a note saying that I was a member of the Royal Geographical Society and of the Historical Society, the owner would let me come in. But no, he sent out word that there was nothing historical about the place, so I must off. Evidently I was there taken for a German also. At anyrate, my two samples of Austrian courtesy were not encouraging.

One can see standing near that castle at Kulm the whole of that battle-field of 1813, exactly as it is described in any fairly detailed history. You can see where the Prussians came winding down over the hills and you can appreciate perfectly how the French made their mistake. They were with their front turned to the south, fighting the Russians and the Austrians, when suddenly this army of Kleist came down upon their rear and demoralised them. The whole situation is perfectly clear while standing at that point and it is a most interesting battle-field to study. The Prussians, who were the victors, were so sure they were defeated that they ran for all they were worth back away from the French; and the French were running in the same direction for the same reason. They got so inextricably confused that when night came and they had run themselves out of breath, they decided to pass the night as friends and to abide by the decision on the morrow; that whichever proved to be the conqueror should take the other in tow.

Then when we came down to the familiar battle-field of Dresden we find that the town has so grown since 1813 that of course much of it is now lost, but standing where Napoleon stood up one gets a tolerable idea of the place.

From Dresden there is a charming little trip out to Bautzen, about 30 miles east of the Saxon capital, through very pleasing scenery. There the whole population still speaks Wendish, and it is the head waters of the Spree that runs from there through the great spongy country that furnishes all the water for those lakes about Berlin. That whole country is a paradise for a canoeist, and it is hard to think about battles and war when you have such opportunities of enjoyment there.

At Bautzen, again, one gets the country unspoilt and almost exactly as it was when Napoleon brought his artillery up against the position of Blücher. The little heights which the Russians and Prussians occupied stand exactly there as interesting to-day as at the battle of Bautzen. The little river Spree is exactly as it was then, dividing the two forces, and one follows the road by which the Prussians and Russians retreated after that day, leaving 2000 on the field. My visit

to the battle-field was almost in its anniversary in May of 1893, after 80 years interval, and I ate my lunch on the same spot that Napoleon had used to spread his carpet and dinner service before the day's engagement.

Bautzen is one of that chain of battles, as you all recollect, which commenced near Leipzig at Gross Gorschen (it is sometimes called Lützen) on May 2nd, 1813. There the new army of Prussia fought its first battle against Napoleon. Each claimed the victory; but from Lützen they retired in good order to Bautzen where they fought on the 20th and 21st May. The allies with only 24,000 checking Napoleon with 75,000. They kept fighting these drawn battles and retired in order, and it must have been in reference to these battles that some witty French soldier remarked: "A few more such victories and we are lost." It was at that battle of Lützen that Scharnhorst was wounded in the leg, and it was from that wound that he died in Prague a month or two afterwards.

When I was working in the German General Staff Archives at Berlin I was shown one of the last letters ever written by Scharnhorst, and I asked permission to have it photographed, thinking that possibly I could use it in the historical work I was engaged upon at the time. It was done for me and, as far as I know, this is the only fac-simile of that letter. It was my intention to present it to your Institution if you thought it worth while to take charge of it *(cheers)*.

I have perhaps an exaggerated feeling about Scharnhorst on account of the amount of work that he had cut out for him in merely keeping in his position. The King disliked him as he disliked every man who was energetic. Frederick William III. was surrounded at that time by the old style of courtiers who advised always to do nothing, to leave things as they were; and Scharnhorst was a quiet patient reformer, who yielded to them at the moment, but always kept his purpose in view and finally produced the reform which to the King seemed a pestiferous revolution. Frederick William opposed universal service in the German army, because he said it would arm the people against their Sovereign. He said his Crown would be worth nothing if the people had arms and he wanted only a small select army of guards which might protect him against the radicals at home.

Lützen first gave the "Iron Cross" its significance. It may be interesting just to note here the evolution of the "Iron Cross," and I think you will see the connection at once. Here is the Cross of the

old Religions Order of the German Knights. They were a sort of pious freebooting lot who got a license from the Pope to colonise and evangelise wherever they could without interfering with other people, mostly up along the Baltic. They built castles and kept the people in

order. They were just as pious as the Boers and I think treated the natives in about the same rough and ready way. This ancient German order is very popular in Germany, and when it came to adopting some popular medal, it was readily suggested that there should be a revival of that order. Gneisenau wished an insignia exclusively for the new levies of volunteers, the militia, the rural soldiers, so as to stimulate the pride of citizens; but it had no reference to the army in general; and as the country was wretchedly poor the mere manufacture of medals was a very serious item. The cross was to consist simply of two pieces of black and white ribbon sewn upon the coat. This was in the year 1811, so the design of the "Iron Cross" preceded by two years the date com-

monly assigned to it. The King opposed the original design because it appeared to him that there was something democratic about it; there was something which he thought was undermining, or subversive of authority; and so when the war did break out he created the "Iron Cross" in its present shape, as a military medal for regulars as well as volunteers.

Iron at that time was in Germany, an exceedingly popular symbol,

for it indicated the terrible struggles that they had gone through. "Blood and Iron" was then a watchword.

In Germany to-day the credit for conceiving and instituting the "Iron Cross" is given to Frederick William III.—but I cannot find evidence for this. It seems to me that Gneisenau deserves this honour.

The German General Staff has produced monumental works in commemoration of the war of 1870; and the battles of Frederick the Great. As yet, however, they have not published the history of this war of 1813; perhaps because it was so much of a disgrace to their own army and because the King played so very poor a figure.

In this little sheet that I hold in my hand, less than *Punch* in size, you see the exact fac-simile of the principal newspaper of Germany in 1813. It has four pages and it contains the "Address to *My People*" on the opening of the war against Napoleon; and "*To my Army*" there comes the degree establishing the "Iron Cross." It is a curious little thing—it shows, one may say, how the modern newspaper has evoluted from it. And this is also significant, because to-day the German Emperor makes his addresses first to the army and last to his

people; which would imply that in those days they had more need of the people and so they put the people first.

Here below Dresden is a little place called Torgau, which is now mostly known on account of the "Torgauer March," but near there was born Gneisenau at a little village called Schildau. It is eight or nine miles from the railway and, I think, as many from the river. I drove over there with the man that carried the post and he was a very communicative man. So I asked him about Gneisenau, but he had never heard of him, and this was in the intelligent country of Saxony. I was a little discouraged by this because I had hoped to learn from him the house where Gneisenau was born. I knew that it was at an old inn called the "Gold Mug," or something of that kind; and Gneisenau was born under very romantic circumstances.

It was in the year 1759, I think, when Frederick the Great's army was driving back the Austrians from Torgau. Gneisenau's father was an artillery lieutenant in the Austrian army and he had run away with the young lady who afterwards became Gneisenau's mother. During the hurly-burly of that winter's campaign, little Gneisenau was born in this old inn of Schildau. On the ground floor the walls are at least four feet thick. The house is no longer an inn, but the home of a miller, who has nothing but a cheap lithograph to indicate the interest that attaches to the place. There is not the slightest outside indication that anyone takes an interest in the house, or that anybody makes patriotic pilgrimages to that village of Schildau. One would suppose that the house would be purchased by the nation or, at least, that a plate on the wall would call attention to the great man who here first saw the light.

That night I went to visit the parson of the place and as he had been newly appointed he was exceedingly energetic and interested. He had never heard about Gneisenau having been born there, but he produced his church books and looked it up; and then allowed me to take a photograph of the entry in that book according to the christening. This photograph I have here, and I should like to add this to your other historic treasures *(applause)*. I feel as though I was purchasing your applause *(laughter)*. But the historic interest of this is that it gives the complete and obvious reason why Gneisenau's mother does not appear on the register of her son's baptism. There was, as you will see by this, no officer of importance present at the ceremony. It was evidently a painful ordeal. She hurried off with her all too heavy, if not unhallowed burden and the child fell from her arms at night (whether intentionally or by accident we shall never know) and would have been run over by the next artillery wagon if some kindly soldier had not picked it up and brought it to the mother again. Whether it was a welcome return I do not know either. Little Gneisenau's mother soon died of shame, neglect and suffering, and he was farmed out to some peasants in the neighbourhood. But the father, whose name was Neidhart, soon forgot to make payments and the little boy was set to attending geese in order to earn his bread.

One day a pedlar or a tramp came by there begging and the little boy had nothing to give him. But he said he had at home a hymn

book of his mother's; so he ran back and got the hymn book and gave it to the tramp and the tramp took it and tried to raise some money on it. But the person to whom the tramp first brought the book was suspicious; and upon examining it discovered the names of his mother's parents. By that means the child became known, and pretty soon a coach and four drove up and took the little boy away and he was educated and lived to become Blücher's chief of staff. He discovered, or somebody discovered for him by a process of reasoning which is quite beyond my faculties, that his ancestors had had a castle called Gneisenau somewhere in past ages. On the strength of this shady knowledge he assumed the new name and dignity. When he grew up he entered the Prussian army and found that it was customary under the Great Frederick that officers should either be noble or, at least, claim nobility—about the origin of which they were not very particular in those days. So he at once changed from Neidhart to Gneisenau.

The uninitiated is a little puzzled to discover why he never called himself "of Schildau," but preferred to be entered as "of Torgau," when he went to the University of Erfust at the age of 16. It seems that Schildau has a reputation for uniting all the "sillies" of Germany. Whenever you tell an outrageous story about a fool it is always somebody from Schildau, and the name of "Schildauer" is a synonym for all that is absurd. They still tell the story about a woman of Schildau who had a cow, which she desired to pasture upon the town walls, but strangled the beast in her efforts to pull it up. Another story refers to a house that was supposed to be on fire. The people rushed out with their buckets and pumps and squirted water over the house and finally discovered that it was no fire at all, but merely the reflection of the moon upon the window panes, and so on *ad infinitum*. All such stories in Germany are attributed to Schildauans. But such trifles as these were enough to affect history and so make people for a long time believe that Gneisenau was born not in Schildau, but in Torgau. Fortunately this fac-simile *here* is able to give us the true birthplace and birthday of the only citizen of Schildau who was not made to be laughed at.

The battle-field of Leipzig will always be interesting; although it is such an enormous task to get about it that one forgets what one saw first, when the last field is reached. One is shown the spot where Ponyatowski, the plucky Pole, was drowned, in the river which is little larger than a big ditch. Then one sees the narrow dyke, which is the only means of getting from Leipzig across on to firm land again, where the French armies chased and chased along after they had been beaten; reminding one of those horrible scenes in the Conquest of Mexico. Close to Leipzig are those flat plains of Lützen which seem to have been made especially for battles or manœuvres. Not only was the battle of Gross Görschen fought there, but Frederick the Great's big battle of Rossbach and Gustavus Adolphus' big battle of Lützen; and it forces upon one the conclusion that this is essentially the military and political centre of Germany. It became early the central city for intelligence—it was the centre of the book trade, and every road from

24. Johann Friedrich [illegible] Sohn Johann Friedrichs Franken, Einwohner in Schildau und seine Ehefrau Christina Elisabeth geb. Benselin wurde den 27. Octobr. Mittags um 2. Uhr geboren und den folgenden getauft. Pathen: Herr Christian Berber, Burgermeister, Johann Christiana, Herr Johann Gottlob Landsitzers, Oberschenk und Gastgeb in Schildau, Herr Johann Christoph Zenkel Inw. und Müller, alle in Schildau.

25. August Wilhelm Antonius, ein Schildauer Sohn August Wilhelm von Reibart, bis da Zur Königl. Armee gehörigen Artillerie bisheriger Lieutenant und seiner Ehefrau Fr. geb. Müller aus Würzburg wurde den 27. Octobr. vormittags geboren und gegen Abend getauft. Pathen: Herr Antonius von Krumbecs, Major über das Corps der Pastor Herr Daniel Christian Tittmann Unterthan Fr. Johanna Regina Rosina, Herr Johann Christoph Wolff, Ehemann in Wegra Schulhalter, Herr Johann von Klitzsch, Lieutenant unter dem Königl. Regiment Zietenhusaren, Herr Ludwig Erdmuth, Herr Carl Heinrich Hennens, Stadtschreiber und Justiz Consulentens in Schildau jüngster Sohn und Matias Thomas, General Steuer Einnehmer in Schildau.

Trost v. Greiz. d. Königl. Frau Wittwe, gestorben d. 24 1831 Hauptmann in Posen

26. Johanna Voretzsch eines ehrlichen Vaters Tochter Anna Elisabeth, weil. Herr Johann Gottlieb Kieselsteins, gewesenen Bürgers und Zeugmachers in Schildau ältste Tochter, wurde den 10. Nov. Nachmittags um 3 Uhr geboren und den 16. Nov. getauft. Pathen: Fr. Johanna, Herr Johann Gottlieb Richters Einw. und Schneid, Johann Christian, Inst. Herr Johann Christian Fischers, Burgers Schmidt in Torgau Tochter und Herr Johanna Voretzsch, Johann Michael Krügers, Zeugschmid in Torgau Tochter, Angelika Gottlieb in Schildau. Sie starb den

† d. 29. Nov. 1760.

every part of Germany seemed to go through Leipzig. It is amazing, as a matter of geography, the number of people who have to go through Leipzig in getting about Europe. The roads from Vienna, Warsaw, Copenhagen, Paris, Hamburg, Rome, all seem to lead through Leipzig. While engaged upon that part of my history I could not help wondering that Leipzig was not made the capital of the German Empire in 1871. If you will draw a circle around Leipzig you will see that it includes Denmark and the borders of Poland, Vienna, Prague, Munich, the borders of France and Belgium. In fact it is almost the centre of a circle which takes in the whole of Germany, and I take it that the German Emperor to-day would have had an easier task in the government of that great Empire if Leipzig had been made the capital. It would have moderated that feeling of dislike between south and north Germans. Berlin is still essentially a Prussian capital, and in cities like Munich and Dresden the people pay grudging homage to Berlin as the capital of their Empire. But that is political.

At Lützen the country is so flat that it is very difficult to discover the historic features of the battle-field without great pains. The villages are so exactly alike as to be confusing, like trees in a forest.

The head-quarters of Napoleon on May 1st, 1813, are occupied to-day by officials of the Government. I dined at the *table d'hôte* with various local functionaries who took interest in the object of my visit, but not one of them apparently knew much about that part of the country. I suppose the reason was that they had been appointed from other districts. But there is one point that can be identified very satisfactorily, and that is the only rising ground, if I can speak of rising ground in a plain that appears to be flat—a slight elevation where Napoleon massed his artillery towards the close of the day. Here it was that Napoleon is described as having for a moment turned to his aide-de-camp with a look that meant to say: "Do you believe that my star is going down?" He had never yet met troops that could face him as these troops did; it was a complete revelation to him after the experience of Jena in 1806, to come back to within a few miles of that field and to meet practically the same people resisting him and fighting for every inch of the ground and meeting him in hand-to-hand struggles in these little villages and showing an obstinacy and manly courage that he could not explain. That battle, although a drawn one, gave the new popular army of Scharnhorst enormous courage for the continuation of the war. There was only one man in the whole Prussian army who despaired, and that was the King, but then he was born so.

Then we come down to another place *here (pointing to a map)* which I shall rapidly touch upon because it is now late, and that is Wartemburg. Let us once more take to our canoe at Torgau and sail down the river to the place where Blücher took his army across the Elbe and threatened Napoleon's retreat—not a decisive battle, a desperate fight in a desperate swamp. At Wartemburg I could not help thinking of some of the native villages on the African coast embedded behind swamps. It is most difficult of access from the Elbe and is protected from the high

water of the river by little dykes. The Prussians had to fight up to their waists in the mud, and the hardest work they had to get through there was at a place called the Sananger, which means a "hog wallow," a boggy hole; and they drove the enemy out there with wonderful pluck and dash—this new army of volunteers, which consisted largely of men who had never seen a battle before. It was there that the men who fought against them most obstinately were not the French, but their own fellow Germans, and from that time on, until after Leipzig, the struggle against Napoleon took upon itself something of the character of a civil war—Germans against Germans. The hatred of the north of Germany against the south of Germany was so intense that it was with the greatest difficulty that they could be got to give quarter.

Now at Wartemburg I think I shall lay up my canoe for the present; not because the further cruise to Hamburg is devoid of interest, but because your clock is keeping time for you—as well as for me.

In conclusion permit me to pay a tribute to my canoe again for one advantage which it has over the bicycle or the horse or any other means for assisting the progress of a single man in a strange country; and that is that it has excellent dry storage room for maps and books and other works of reference which are so valuable. You can read and write as you go and never never be fatigued. I do not know of any means of locomotion which affords the inquisitive stranger so many important advantages as does the canoe I have sought to tell you about.

By the way, on one occasion I was cruising from Potsdam along the old line of works prepared in 1813 for flooding the country about Berlin, in anticipation of an attack by the French, when I came to a point where the water stopped and I had to carry my canoe over to a long ditch which my maps told me would connect with a point I was seeking. I found but two or three inches of water under my keel; but as I soon entered a Government forest where deer abounded, I ceased to care where I was going, and followed the stream for several hours, most of which I occupied by dragging the craft over sand bars. Suddenly the forest ceased and as I glided under a bridge I saw a Prussian sentry who was fortunately looking away from me. I took no pains to attract his attention, for I found I had come out immediately at the point where the artillery experiments are made—which is an exceedingly serious thing if caught. I was apparently either a poacher or a spy, and the choice of character embarassed me. Time commenced to drag with me. I disliked the idea of this chap on the bridge discovering me. So I lay under the bridge and watched till at last his helmet disappeared, and then I made the water boil as tho' the devil were blowing into it and soon came out into a broad lake where I was once more safe.

This shows what can be seen from a canoe even without making much effort.

I thank you very much for listening to my lecture *(cheers)*.

DISCUSSION.

CHAIRMAN—Before returning our thanks to Mr. Bigelow for his lecture, I may mention that he would be very glad to answer any questions you may like to ask him about his trip. With reference to what he said about the making of the Prussian army, I remember an old Prussian general officer telling me that it struck him at the time as an enormous revolution that after Jena, when the new army had to be imbued with the spirit of the nation, the Prussian officer for the first time addressed his soldiers in the second person instead of in the third person. They had been in the habit of addressing them in the third person, that being the most contemptuous form that could be imagined. He said it may now appear a trifling thing, but that it was one sign of an enormous social revolution. Now if any officer, or anybody else, has any remarks to make, we shall be very glad to hear him.

MAJOR-GENERAL MAURICE—I think we can hardly do other than congratulate ourselves on having asked Mr. Bigelow to lecture to us after hearing his very interesting account of what can be done with the canoe, and the extent to which, by its help, history may be studied in the places where events occurred. The only point upon which I am inclined to say a few words is the remarkable evidence which Mr. Bigelow has given us of the completeness with which the memory of Scharnhorst and Gneisenau has passed away in the very places in which the one was born and the other died. I cannot help thinking that that forgetfulness of the men was closely connected with the fact that all the great work that they had done for Germany had been allowed to perish. It is easily shown that that had happened. In 1859, when the French were fighting against the Austrians and driving them back, Prussia had a much keener sense of the general interests of Germany than she had had during the period which preceded Jena, when her policy was about as disgraceful as it could possibly be, so that that great disaster really seemed a just judgment upon her for her fickleness. She had become sufficiently conscious of the mistakes of the earlier time to be in 1859 most anxious to move to the support of Austria for the purpose of resisting what threatened to be a new French invasion of Germany. As soon as the French troops, passing out of Italy, should enter Austrian territory, Prussia determined to treat it as an attack upon her as much as upon Austria. Therefore, she attempted to take advantage of the mode of organising her army, which had been created by the great men of whom Mr. Poultney Bigelow has been speaking. She tried to mobilise for war. But in order that the work which has been done by great men in the past shall be of value to those who come after them, there must be other men to carry it on and to sustain it. That had not been the case in Prussia. Only the forms of the system remained. There was no life in it. The whole thing completely collapsed. Prussia tried to get her army together and it absolutely broke down in her hands. Moreover, that was not the first time that that experience had come to her since the deaths of Scharnhorst and Gneisenau and Stein. In 1848 the revolutionists had tried, by a distinctly popular movement, to anticipate that union of Germany which has taken place in our time. They offered the Crown of Germany to the King of Prussia as the best representative they could get. Then also Prussia had made an attempt to take advantage of all that work of Scharnhorst, Gneisenau, Stein and Bernstein. The thing so completely collapsed in her hands that when Austria advanced her troops to the Prussian frontiers she was able to dictate one of the most disgraceful peaces that Prussia ever made. The King of Prussia was obliged to surrender the Imperial Crown, which he was ready to accept from the "Reds," and to sign what was called "The political capitulation of Olmutz."

Now I think it is of very considerable interest to follow that sequel to the history of those times and of those great men of whom our friend Mr. Poultney Bigelow has been speaking to us; because from generation to generation the same story is repeated. Scharnhorst, Gneisenau and all these men had, as Mr. Bigelow has been telling us, to fight through all sorts of pedantic opposition from the King and the men who were around him in order to make Prussia strong enough to win her independence from Napoleon. The lesson did not last for two generations. A long peace followed. All that they had done was forgotten. Within little more than 30 years their work had collapsed and the whole thing had to be rebuilt again, as it has been rebuilt in our time by a few resolute men setting to work on the lines that Scharnhorst and others had laid down, but restoring and strengthening the superstructure with those wonderful results of which we know. What, however, is most remarkable, is that in each period the subsequent strength of the Prussian army was due to the discovery of its weakness. Jena led to the creation of the army by Scharnhorst and Gneisenau. The collapses of 1848 and 1859 led to the modern German army of to-day. The army which remained in 1860 as a tradition from the time of Scharnhorst and Gneisenau would have been absolutely incapable of winning the campaign of 1866 in Bohemia, or even the campaign of 1864 in Denmark, still less the 1870 campaign against France. Those victories were due to a complete re-vivifying of the whole of their institutions by men who realised the causes of their previous disasters. In the years that followed 1859 and 1860, when the grandfather of the present Emperor was the heir apparent to the Prussian Throne and practically, since the King, his brother, had become incapable of ruling, was the Governor of the Kingdom, he and the men he gathered round him, Bismark, Von Moltke, Von Roon, created the modern German army amid difficulties and opposition as great as those with which Scharnhorst and Gneisenau had met. The case of a weak King is exactly balanced by that of a chattering and do-nothing legislature, opposing the reforms of a strong King. In 1860 the renovation of the country was due to a patriotic and able King. His Ministers carried out their schemes at great risk nevertheless, because of a popular opposition which did not realise the necessities and requirements of the times *(cheers)*.

Chairman—If any other officer or gentleman would like to say anything we shall be very pleased to hear him. If not, it is only left for me to say that I am sure I cannot adequately express to Mr. Poultney Bigelow the thanks of the meeting for the very interesting lecture he has delivered this evening and for so kindly coming down here, and also for those valuable relics he has so kindly left us. I am sure we are all very grateful to him, and in expressing the feeling of the meeting, I beg to thank him for his great kindness *(great applause)*.

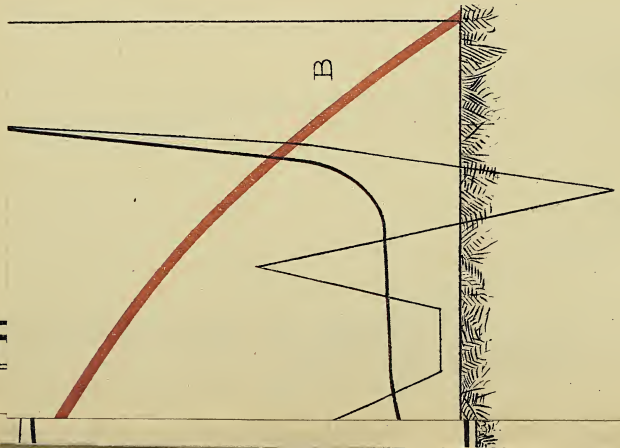
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Fig. 2.

TRAJECTORY 6 IN. B.L. HOW.

M. V. 501 f. s. — ELEVN 60°.12'.

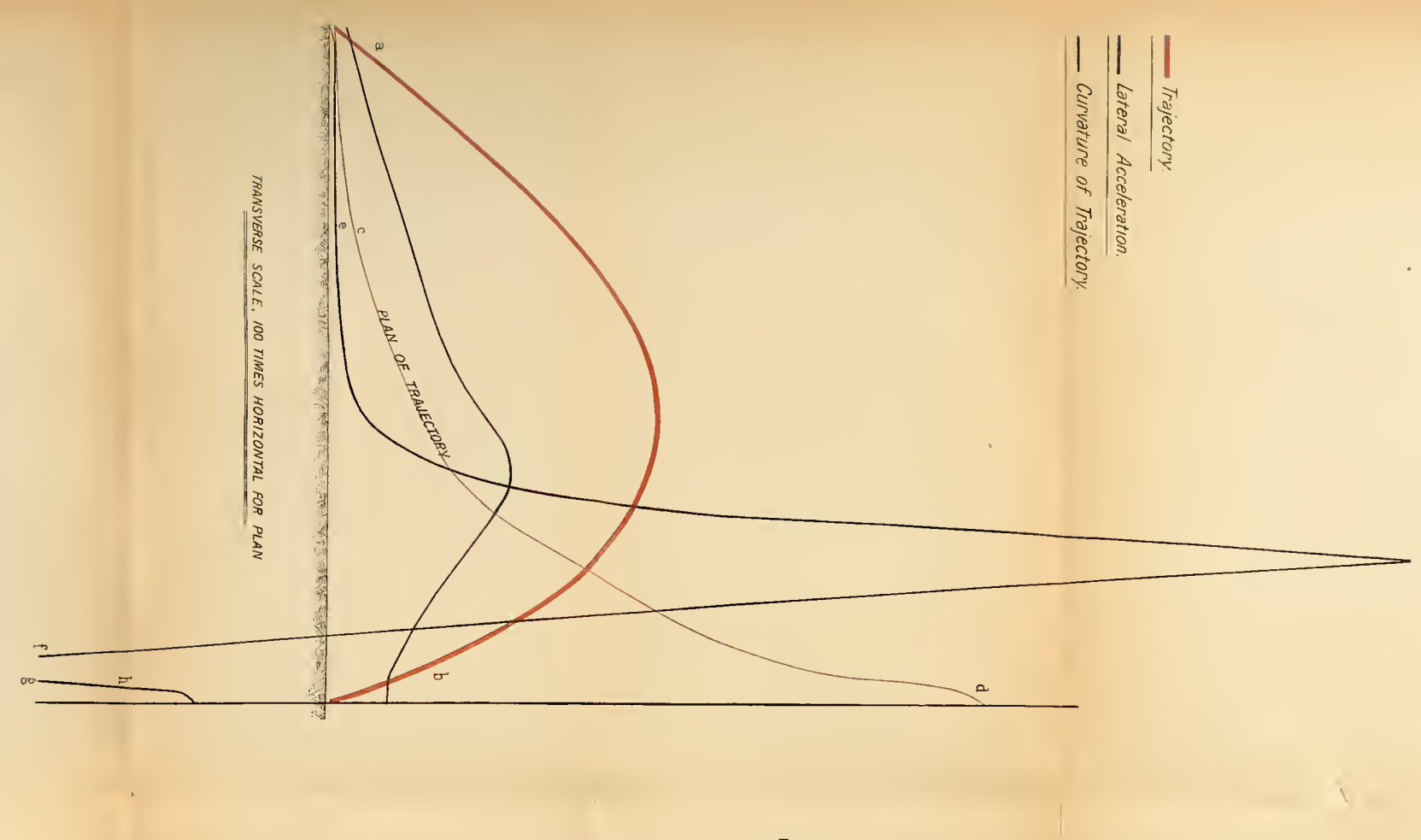
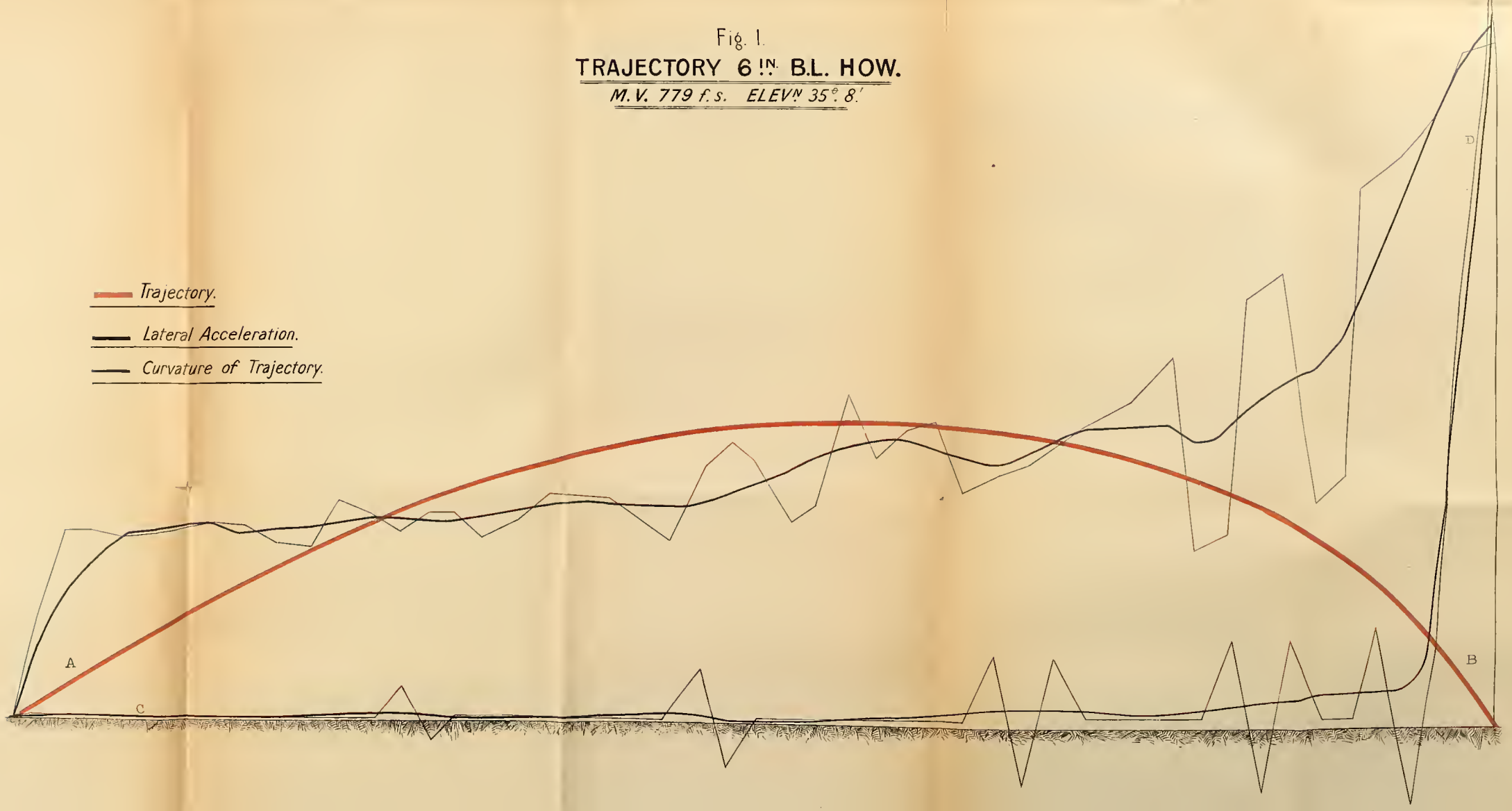


Fig. 1.

TRAJECTORY 6 IN. B.L. HOW.

M. V. 779 f. s. ELEVN 35°. 8'.



THE DRIFT OF SERVICE PROJECTILES.

BY

CAPTAIN A. G. SHORTT, R.A.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Monday, 25th Jan., 1897.*)

COLONEL E. BAINBRIDGE, SUPERINTENDENT ROYAL LABORATORY, IN THE CHAIR.

THE CHAIRMAN—Gentlemen, I have much pleasure in introducing to you to-night Captain Shortt, who has agreed to open a discussion on the subject of drift *(applause)*.

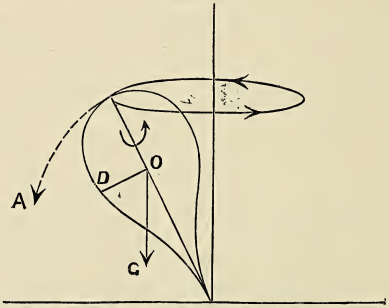
CAPTAIN A. G. SHORTT—Colonel Bainbridge and gentlemen, what I have to talk to you about to-night is rather the position of the long axis of flight than drift, although I wish to consider it in connection with drift. There seems to be a great deal of difference of opinion about the position of this long axis and several different ideas are held with regard to it. One, I believe, is that, after the projectile steadies itself down shortly after leaving the bore, the point remains in the trajectory and, as the trajectory curves, the point goes down with it. Another theory is that in the last half of the trajectory the point is above the trajectory itself—*i.e.*, instead of keeping down in line with the trajectory, the point is above it. The generally received opinion, however, is that the point describes a spiral round the line of motion and this spiral completes one or two revolutions. General Owen, in his lecture about a year ago, said that it cannot make more than one revolution, if as much, because in that case the point would be alternately on the right and on the left and therefore the drift would be alternately to the right and to the left and so there would be no resultant drift at all. That theory I do not hold altogether, although I hold that the axis describes a spiral round the trajectory. Professor Bashforth says that because the first motion of the spiral is to the right and because, afterwards, the point is more to the right than to the left, therefore the drift is to the right by reason of the pressure of the air on the left side of the shell; but, although I agree that the point is more to the right than to the left, I do not see what the first initial motion being to the right has to do with it.

The ideas that I hold are as follows:—When the shot is fired from a gun it is very often unsteady at starting; shortly afterwards, however, it settles down into the trajectory and let us consider the forces that we then have on it after that. In doing so I wish to separate entirely the motions of translation from those of rotation—that, I think,

we can always do. Let us consider the case of a pointed projectile and then, supposing it starts point first, with no rotation at all due to rifling, the shot will soon find itself broadside on; I think there can be no doubt about that—it is the same in everything in nature. If a ship is moving through the water it has to be kept to its course by the man at the wheel constantly, otherwise it would find its nose getting further and further from its original direction. If a shilling is dropped into the water edgeways, instead of going down perfectly straight, it will turn flat and afterwards it will zig-zag down chiefly in a nearly horizontal position; if this were not so the Aden diving boys would never be able to get the threepences and sixpences that one throws overboard for them. And quite irrespective of what the action of the air is on the projectile, or where the resultant resistance will act, whether in front or in the rear of the centre of gravity, the actual result is that the point of the projectile is driven away from the direction of motion; that, I think, is pretty certain. Accordingly we have a force of rotation acting in some way to take the point away from the line of motion in the plane which contains the long axis of shot and the tangent to the trajectory for that instantaneous position of the shot, so that, as regards motions of rotation, we have the rotation round the centre of gravity tending to take the point away from the line of motion and also we have the initial rotation which we give from rifling.

Now the effect of these I want to illustrate and I think it is best illustrated by an ordinary top. If Fig. 1 be a top, supposing it to have

FIG. 1.



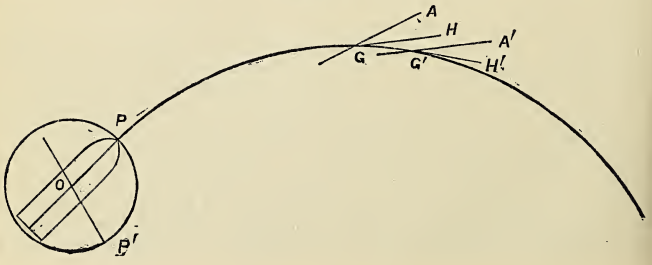
no spin round its long axis, it will simply fall to the ground by the action of gravity acting through its centre of gravity; that causes it to rotate round its point in the direction represented by the arrow A. It is exactly similar to the force acting on the projectile tending to turn the point away from the line of motion. Now let us consider this motion of the top. It has two rotations—the spin given to it by the string and the force of gravity tending to turn it round in the direction shewn. If we combine these two (and we may combine them very simply by the ordinary theorem in dynamics of combining the two axes

of rotation in the same way as in the theorem of the parallelogram of forces), we get a resultant axis of rotation for that instant, the direction of which, passing through the centre of gravity, lies between the component axes of rotation and will be close to the axis of the spin caused by the string as this is very much faster than the second component rotation. The first component rotation has for its axis the long axis of the top; the second has an axis through the centre of gravity at right angles to the plane of the paper. So that, the resultant axis being in the plane of these two axes, the effect of this instantaneous motion is to move the resultant axis out of the plane of the figure in a direction at right angles to that plane; and that is the point I want to get out—that the initial motion of this axis is round an axis eccentric to the top and in a plane at right angles to the plane of the board. And this occurs at every instant; the next instant it will move at right angles to the plane it was in at the previous instant and so on. So that eventually this series of instantaneous motions resolves itself into a circular movement of the upper end of the top right round the vertical. Now an ordinary top has the property of going to sleep, a gyrostat top, such as children play with, has no property of going to sleep and the reason is that the gyrostat top will keep its point in the same spot as it is spinning; an ordinary top will not, it will go running round the table and therefore there is a certain amount of friction set up as that point moves over the ground that causes a rotation round an axis O D. Combining this third axis with the resultant instantaneous axis which we have just got you get a final resultant axis which approximates very slightly to the vertical; the result being that the circular movement of the upper end of the top will alter into a decreasing spiral and every instant, by reason of the friction of the ground, an ordinary top will come nearer and nearer in to the vertical and finally go to sleep; but with a gyrostat top there is no motion of this kind and in the case of a projectile in flight I cannot find any reason why there should be any motion of going to sleep at all; there may be, but I cannot find it; and at all events that does not interfere with what I am about to say. Now, in applying this principle to the motion of a shot, the effect of the two rotations on a projectile—viz., the spin of rifling and a force that is tending to turn the point away from the line of motion is that its axis must move in a direction at right angles, or very nearly at right angles, to the plane containing the long axis and the line of motion at that instant. I do not see that anything can stop this motion. If the long axis finds itself at any instant non-coincident with the line of flight, it is an absolute impossibility for the point to go down *in the same plane* into conjunction with the line of flight; it can only move out of the plane, and when it is out it is still going at right angles to the instantaneous position of the plane until it completes a regular spiral round that line. The only condition, apart from the fact that the shot may go to sleep eventually, is that the motion of the point must be always at right angles to the plane containing the long axis and the tangent to the line of flight. Now if the trajectory is a straight line there may be a possibility of its going to sleep, I

admit; I cannot see it, but it may be so; but the condition of a top going to sleep is that the vertical always remains in one given direction and condition of sleep is that the axis of the top be coincident with the vertical. Supposing that the vertical were capable of altering its direction you could not have the top going to sleep with a variable direction for it to go to sleep in; and if the trajectory is curved I do not see the possibility of the shot going to sleep, because the direction of the line in which it is trying to go to sleep is always changing, so that it cannot attain the position of sleep.

Now if the trajectory were straight the curve that this point will describe round, and with reference to, the line of flight, will be either circular or spiral. It will be circular if there is sufficient spin and if there is no reason for its going to sleep. If there is a reason for its going to sleep, it will form a decreasing spiral until it goes to sleep. If the spin is not sufficient to keep it there against the turning power of the resistance of the air then it will describe an increasing spiral, but that spiral will be perfectly regular, simply from symmetry; there is nothing to take it out of regularity and the result will be that the curve will lie as much at one side as the other, there cannot be any reason why the resistance of the air should take it bodily to one side or the other and there cannot be any drift. But the case must be very different when the trajectory is curved, as I will now show, but one more thing I want to say in connection with this spiral motion or precession, and that is, that so long as the point is above and to the right of the line of motion or the resistance of the air and until the axis of the shot gets down on to a level with the line of motion, it must be going to the right and down. Directly it gets below the line of motion then it will be still going down, but it will be coming in to the left, simply because the point must move at right angles to the perpendicular from the point on to the line of motion, so that when it has got right underneath it will move to the left and up and in the last quarter it is coming up, but to the right again. What I want you to remember is that, as long as the point is to the right and above the line of motion, it must be going down and it also must be going out to the right, simply from the nature of the instantaneous motion which causes the axis to precess.

FIG. 2.

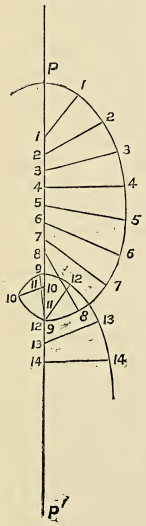


Let us now consider a curved trajectory (Fig. 2). Let O be the centre of gravity of the shot. With that centre and radius equal to the distance of the point from the C G, let us describe a sphere round the shot. Thus we see at starting that O P is the direction of the axis of the shot. At the end of the trajectory the axis will have a direction something like O P′ and at some time between, at the top of the trajectory the shot will have a horizontal direction, so that we can draw the direction at any time from the centre to the outside of the sphere, representing the direction of the axis at any given point of the trajectory. The direction of the resistance of the air, on the other hand, is the reverse of this. At starting its direction is P O and its direction cuts the sphere at P. At each succeeding point it cuts it at a lower and lower point, so that you may say that the direction of the resistance of the air cutting the sphere at a lower and lower point is in fact describing a vertical descending line on it from P to P′; at each successive instant you get a lower and lower point where the direction of the air cuts it. Similarly the point during its flight will come down until it gets to the position that it has at the end of the trajectory. Now, although the line that the air resistance cuts on the sphere will be part of a vertical great circle circular of the sphere, the point, as it describes a spiral round the trajectory will not be absolutely in that line, it will describe a kind of spiral round it as it comes down, sometimes being slightly to the right of it, sometimes on the left.

Let G A at any time be the position of the shot and G H will be the tangent at that point; and let the point be in the same vertical plane of the trajectory and above it. There is no reason why we should begin here, but it is more convenient. During the next few moments of that shot's flight the point must come out of the vertical plane and try to get down to a level with the tangent to the trajectory and until it gets down on a level with it it must be going to the right and down. If the trajectory was a straight line by the time it got to a position, say G B, it would have got its point down to a level with the direction of the tangent G H, only of course the point would be out to the right; but, as the trajectory is curved at G B, the trajectory has changed its direction and its tangent, instead of being parallel to G H, will have got down to a position G′ H′. The point, therefore, has further to go before it can catch it up. As the trajectory has been curving downwards, therefore, the point has got further to go before it gets down on to a level with the line of the trajectory than if the tangent were fixed in direction, the result being that the faster the trajectory curves the longer it will take the point to get down to it. Until it gets down on to a level with the tangent of the trajectory, the point and therefore the axis, must be going not only to the right but down, it is following it down and on the right of it. When it has once got down to a level with the tangent it is at its widest on the right and it then will be trying to get in underneath it; and that also takes some comparatively considerable time, because it must move at right angles to the plane containing the line of motion at the time of

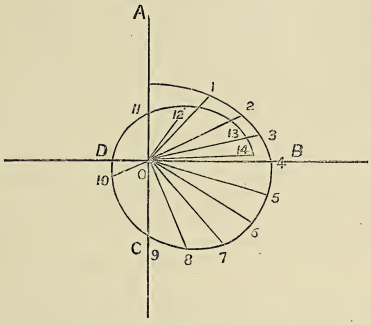
the axis and as the trajectory curves down it prevents its coming in by tending to retard the angular velocity with which the spiral is described round the trajectory. When the point, however, has got actually underneath, it begins to show itself on the left of the trajectory and begins to rise. Now, supposing the trajectory were straight it would have to traverse this third quarter in much the same time that it would take to traverse the first quarter under similar conditions, but since the trajectory is curved, this quarter will take a shorter time to describe because the point is moving up, while the direction of the tangent to the trajectory is moving down. The change in the direction of the tangent therefore helps the point in this quarter by meeting it half way and, therefore, in this and the fourth quarter the time occupied is comparatively short. That is why it takes a longer time to describe the curve on the right than to describe the curve on the left, because as the point is trying to get down on the right the direction of the tangent is going down too, and, as I say, until the point gets down on a level with it, it must still go to the right and down. On the other hand, when the point on the axis is coming up the change of direction of the tangent, so to speak, meets it half way, both going in opposite directions and that is the reason why that quarter is so quickly passed over. In the one case, when the point is above the trajectory it depends entirely upon whether the precession is fast enough whether the point gets down to it at all and in that case we get the spin losing control of the projectile and the point goes wider and wider to the right. If the spin be sufficient to give it a sufficiently fast precession then it will catch it up, but it entirely depends on the difference in the rate of change of the direction of *these* two lines how long it takes to do it. And in the same way when the point is coming upon the left-hand side it will move over all the faster the faster the trajectory curves downwards. That is one of the points I wish to bring to your notice : that the point takes much longer to come down on to the trajectory on the right than to get up to it on the left and that the faster the trajectory curves the longer it takes on the right, because it has further to get down to it. On the other hand it takes a very much shorter time than it would if the trajectory were straight to come up on the left; the balance of the curve in point of time is therefore greatly on the right. I have tried in Fig. 3 to show the sort of curve described by the point as it is making its spirals. The only condition we have is that the point must move in a direction at right angles to the plane containing the long axis of the trajectory at the time. And here we have it. This is the path of the point P in Fig. 2 as it moves down from O P to O P′ and to see it I must suppose the observer to be at the centre

Fig. 3.



of gravity O of the shot. The vertical line P P′ in Fig. 3 will be the line P P′ in Fig. 2. If the trajectory were perfectly straight it would simply describe a circle round P. If there were anything to bring it to sleep instead of a circle it would be a decreasing spiral, but at every instant this point is descending, as it does in Fig. 2 and the only condition is that the point of the projectile which forms this curve should be always moving at right angles to the radius vector from the point to

Fig. 4.



the position of P for the time being, P moving from P to P′. Fig. 3 then is the sort of a curve that the point of the shot makes as it is going on in flight; Fig. 4 is the same curve, only showing the motion of the point *relative* to the trajectory and is made by keeping P fixed and superposing the radii vectores, both as regards length and direction, of Fig. 3, on this fixed point, and this then is the motion of the point with reference to the line of flight *round* the line of flight; and you will see by actual measurement that the radius vector increases during the first quarter and the point goes wider and wider until the radius vector is horizontal (Fig. 3). From there the radius vector is shortening until you get the point under the line of motion; from then till the radius vector is horizontal on the left side it is still shortening and that is the shortest length of the radius vector in the whole revolution, after which it lengthens out again to the end of the fourth quarter.

Now I wish just to show you how the radius vector lengthens and shortens. One end of the radius vector is moving at right angles to that radius vector, the other in the first quarter is moving in a direction which, resolved along the radius vector, is increasing its length. This can be easily seen by inspection of Fig. 3 In the second and third quarters this latter end of the radius vector which really is moving down the line P P′ is, when resolved along the radius vector, shortening its length and this continues throughout the second and third quarters. This is why the point lies wider on the right than on the

left, because the radius vector is shortening from O B to O D (Fig. 4). After O D it lengthens out again.

Now, as regards amounts in a very low velocity howitzer, the point has just enough velocity and precession to get round at all; in some of the very high elevations for experimental purposes which have been given occasionally, as much as 60° to 70° it has not enough velocity of precession, which means that the trajectory is changing direction faster than the point can follow it down. The result is that it gets left behind and generally, with a howitzer of low velocity, you may take it that it has only just enough precession to get round at all, simply because, as I say, with a smaller charge and a higher elevation, it is found that the velocity of precession is not enough and the shot turns broadside. In a high velocity gun, on the other hand, the spin of rifling is faster and therefore the precession is faster and the trajectory does not change its direction so fast. The result is that the precession will have much less difficulty in passing the first quarter and the curve will more nearly approximate to a circle, that is to say there will be less difference between the size of the curve on the right and that on the left. The preponderance, however, will always be on the right, but, as I say, the lower the velocity and, therefore, the greater the curvature, the greater preponderance there will be on the right in point of time and the wider will it go, because this radius vector lengthens out more; so that you have two things. First of all you have that the time is very much greater on the right than on the left and then you have the radius vector lengthening out on the right very much more than it can on the left.

Well, gentlemen, that is the whole of the theory. The effect of it on drift is a matter of opinion, of course, but it seems (which is true in practice) that with high velocity guns you get very little drift; there will be a differential effect between the curve on the right and that on the left, which will be small. If the trajectory were perfectly straight, as I say, there would be no drift at all, because it would lie evenly on each side. But another effect noticeable in ordinary shooting is the periodic sound that the shot makes in flight and that, I believe, is almost always noticed, at all events I think I have always noticed it myself. That I put down to the change of angle that the axis makes with the trajectory: if the point is wide from the trajectory you get a much louder noise in flight than if the point is nearly in the trajectory; the wider the point is away from the trajectory I think you must get a louder noise, so that periodic sound, loud and soft, in flight would seem to imply a period in which the point is first wide and then not so wide and then wide again. This periodic sound corresponds with the theory of the shot being wider on one side than the other exactly and, as far as I remember, in the 12 Pr. with which I was serving, the time of one "period" would be about one-half second. In a howitzer, on the other hand, of low velocity I believe it has been noticed that the shell goes with its point very wide to the right and if it has not got enough spin it turns broadside shortly after the top of the trajectory. If it has enough spin to overcome that it will go down and

eventually get its point underneath the trajectory. That is what actually happens and that is what would happen according to this theory, because with high elevations of 60° or 70° there is comparatively little curvature during the first third of the trajectory, say, and in the last third most of the curvature must be in the middle third or top of the trajectory. I think I am right in saying that in a high velocity gun the change of direction of the trajectory increases with the range and at the end of the range it is more than at the middle or the beginning. But with a low velocity gun, with high elevation, 60° or 70°, most of the curvature must be up at the top, so that the projectile when it gets up near the top will begin to feel the curvature of the trajectory. Up to this point it may keep its nose approximately in the line of flight—forming its spiral, of course; after that it will have to try and get down to the trajectory and may not be able to succeed—it certainly will not as long as that curvature is changing as rapidly as it does. Some short time after passing the top will be the critical point; if it passes that point, from there to the bottom is pretty nearly straight and it could make up what lee-way it it has lost without the curvature bending much further away from it. What I hold then is that with a very high elevation the point must be on the right unless it has a very great deal of spin up to some way after the top of the trajectory and it is not till then that it can begin to catch up the trajectory again.

It has been said that projectiles starting with very high elevation, if they fall base first, drift a long way to the left, but I think in all these cases the spin has lost command of the shot and it is not until it has turned broadside that it does show left drift. I do not attempt to explain this, but I think that anything after the shot has turned broadside is not of very much account. At the same time it may be on the same principle as in flying a kite with an insufficient tail, it sometimes makes a short dart to one side, stops, and then goes back wide on the other. I do not know whether that may explain it in any way, at any rate I do not consider it myself of much practical account.

As regards the amount of divergence of the point of course it is very small, but I myself consider that the difference between the two divergences of the point to the right and to the left is sufficient to account for a good deal of drift. In left-handed rifling, of course, since the precession is in the same direction as the spin, the precession would be left-handed, instead of right-handed and the drift would be left-handed. Flat-headed shot I do not wish to touch upon, as the action of the air on its front end is not agreed upon.

That, gentlemen, is all I have to say. I hope I have explained myself; but it is a most difficult subject to put into words (*loud applause*).

DISCUSSION.

The Chairman—This time last year General Owen gave us a lecture on this subject and he implied that we had made no progress in it since his time, which was some 20 years ago or more. All I want to know is what is the cause of this, if it be so. Is it because we accept the theories of the text-book that we have got and are quite content, or is it from want of energy? I cannot think that it is from want of energy. Am I to think then that we are content with the theories that we have got? Captain Shortt to-night, by different methods, seems to have arrived at very nearly the same conclusion as Professor Bashforth (*see* para. 143 of Bashforth's Chronograph, edition, 1890). In all the four quadrants of motion of the projectile round the trajectory, as to the point and the position of the axis, Captain Shortt entirely agrees with what Professor Bashforth says; and the reason for drift, too, as given by him, is also very much the same, as Bashforth concludes the paragraph with the following remarks: "Hence we may conclude that the drift will be in operation for a much longer time to the right than to the left." Therefore, the agreement of Captain Shortt with Professor Bashforth would lead me to hope that this theory or something like it may be the accepted one.

But, at any rate, Captain Shortt's opening of this discussion will, I hope, bring us to some definite conclusion to-night so that we may not be told that we have made no progress in the last 20 years (*applause*).

Major A. J. Abdy (Secretary)—I have here, sir, two letters, one from Professor Boys, who writes as follows:—

"27, The Grove,
"Boltons, S.W.,
"*15th January, 1897.*

"Dear Abdy—

"Most unfortunately I am lecturing at the London Institution on Monday afternoon, the 25th, which completely destroys all chance of coming to Woolwich, which I should like to have done.

"I was fortunate to have called on Professor Perry when Captain Shortt was explaining his views upon the precession and drift of shot. While I felt that the reasoning was just and accurate, my quantitative sense was not satisfied. Though, no doubt, mathematical analysis is not competent to give a complete and exact solution, I cannot help thinking that some very remarkable approximations to the truth could be obtained by dividing the path into a number of small stages in each of which the actions should be supposed uniform, from the known resistance on the head of the shot to make a reasonable guess at the amount of pressure and the position of the centre of pressure for any given small inclination and so laboriously, step by step, to find a polygonal approximation to the true curves. Even if such an approximation were very rough, it would, at any rate, afford some evidence as to the proper time of the beating of the shot, which Captain Shortt has observed.

"I feel that some quantitative estimations, however rough, would enormously add to the value of the paper, but perhaps Captain Shortt has figures to adduce which he has not printed in his abstract.

"Yours truly,
"C. V. Boys."

And I have also a letter from Major-General C. H. Owen which he asked me to

read; he has had the argument of the lecture submitted to him:—

"I am glad to find that interest is taken in the subject of the 'drift of projectiles' which I re-opened about a year ago at the R.A. Institution. Having read over attentively what Captain Shortt says with respect to the cause of drift, I must confess I do not quite understand one or two of his propositions. In one remark I cordially concur that in which he says: 'I believe the mathematical analysis of this problem to be impossible.' Many years ago now I pointed out, that while mathematics were indispensable in assisting us to arrange and compare the results of practice, and to obtain from them certain general principles, the facts obtained from carefully conducted experiments could alone afford a sound foundation for the science of gunnery; and I strengthened this opinion by an extract from Sir J. Herschel's 'Discourse on the Study of Natural Philosophy,' where he says: 'It was not till the time of d'Alembert that the method of reducing any question respecting the motions of fluids under the action of forces to strict mathematical investigation could be said to be completely understood. But the cases even now, in which this mode of treating such questions can be applied with full satisfaction, are few in comparison of those in which the experimental method of enquiry, as already observed, is preferable. Such, for example, is that of the resistance of fluids to bodies moving through them; a knowledge of which is of great importance in naval architecture and in gunnery, where the resistance of the air acts to an enormous extent.

"Captain Shortt gives a clear account of the behaviour of the point of an elongated projectile when fired from a gun, which is very similar to that given here by myself last year, but I must notice a point in connection with the second quarter of the movement. He says: 'In the second quarter of a circle the point is below the line of motion, which will be moving still down, but to the left now.' It must, however, be remembered that although moving to the left, the shot will still be inclined to the right, and although this inclination will be gradually lessening, the point will not get to the left till entering the third quarter.

"I confess I do not see why the third quarter will be passed over more quickly than the second. Nor do I know what Captain Shortt means when saying that—'If the trajectory were a straight line, there would be no drift.' Does he mean a case in which there was no such force as gravity to act upon the projectile? If so I agree with him. I also agree with him in considering that the projectile cannot assume a 'sleeping position' like a top.

"From an observation respecting a case where he says the projectile does not complete 'one revolution of its precession at all,' it would appear that Captain Shortt supposes one or more entire circle of the point occurs during the trajectory in most cases. This is entirely opposed to my ideas founded on the explanation given by Magnus, and, as I think, the results of practice. We must remember that even comparatively low velocities give but a few seconds of time for the action of the resistance of the air to produce the conical movement of the point, and that its resistance tending to produce this motion is continually decreasing during flight, to say nothing of the decreasing velocity of rotation of the projectile. I have always held that, except at very high angles of elevation giving long times of flight, the point does not move as far as,

or at any rate beyond, the second quarter of the circle, and that the left side of the projectile is consequently exposed during most of its flight to more pressure than the right side, as the shot proceeds with its point more or less to the right during the whole time of flight, and is therefore deflected to the right (with right-handed rotation).

"This is the simple explanation borne out, I think, by the results of practice and by the motion of the gyroscope, as I endeavoured to explain last year, with very high angles approaching 70°, shells fired from a 6″ howitzer deflected to the left; and at first sight one might suppose that, in this case, the third quarter of the circle had been passed by the point of the shell during the longer time of flight; but it is plain on examination that these shells were unsteady during a large portion of their flight, the velocity of rotation not being high enough to prevent them turning on their longer axes. Besides this, some shells fired from a 9″ gun at 70° had right deflections. Perhaps I may have not understood Captain Shortt's remarks, and I am sorry not to be able to be present to hear his explanations, which would, doubtless, be more satisfactory than judging them by reading over a short printed slip."

The Chairman—Professor Smith, will you help us in this matter?

Professor F. J. Smith, F.R.S.—I have really nothing to say, sir, upon this subject—which is not mine at all—but I should like to ask a question, whether any data have been gathered as to the position of the shot at different points, photographically. I worked, as Professor Boys has, on the early photographs of shots in flight and it struck me that rather more definite light might be thrown upon the question of drift by getting successive photographs showing what the shot is really doing. Probably the process may be thoroughly well known here; I am speaking in entire ignorance of what has been done in these buildings on the subject. I do not know whether it has been done at present, but it strikes me that it might throw light upon the position of the shot in flight.

Major P. A. MacMahon, F.R.S.—Captain Shortt has considered the question from a great many data, but he has not brought to consideration at all the position of the centre of gravity of the shot with respect to the figure of the shot—it seems to me that that is a very important point. It is a matter of common experience that the more forward the centre of gravity the greater the tendency for the shot to keep tangential to the path.

There is another point I should like to ask Captain Shortt about in connection with the remark he made that "if the path of the projectile were a straight line there would be perfect symmetry of motion of the point of the shot about the line of flight," because he said there was perfect symmetry and he did not see any reason why there should be any difference on one side or the other—to the right or to the left. It seems to me that there is a want of symmetry really, because, as the projectile advances along its path, supposing the path to be a straight line, the pressure of the air upon the shot diminishes and, therefore, during the second half of the revolution of the point there will be a less pressure than during the first half of the revolution. This seems to me to destroy that symmetry upon which Captain Shortt relied when he said that he thought that if the path of the projectile were a straight line there would be perfect symmetry of motion of the point about the path.

Captain Shortt made another remark to the effect that with a very high velocity gun the drift was very much less. It is almost obvious that this must be so from the fact that the time comes into the question, and that with a high velocity gun the projectile has really less time to deflect from its path. I was thinking, when Captain Shortt was speaking, of what happens in billiards. It is well known that

if you play a billiard ball putting on, say left side, and strike hard, there is a negligible deflection from the line of aim of the ball, but that if you play very slowly, so as to give a good spin to the ball with a very small velocity of translation, it is well known that the ball will drift to one side or other of the line of aim. As showing how difficult these questions are to consider, I should like to observe about a billiard ball, that if you play with the left side and *with* the nap of the table, even with a well-worn table (it is well known), the drift of the ball is to the left, but if you play *against* the nap it is also fairly well known that the drift of the ball is not to the left, but to the right, so that whether you play with the nap or against the nap makes all the difference as to whether the ball drifts to the right or to the left when you put on left side. This fact is mentioned by Major Broadfoot in the Badminton book on billiards and I have seen it abundantly verified on billiard tables, on some of which there was little nap. There is also the question of how high velocity comes in with regard to the game of golf. I have not played golf to any large extent, but I have noticed that the golf ball only begins to show the effect of spin upon it, making it either rise or go to one side or the other when its velocity has diminished to a considerable extent, that is to say, that the drift of the ball, out of what would be the normal path for an unspun ball, is scarcely observable until a certain point is reached when the velocity has considerably fallen and then the effect of the spin of the shot, in causing drift, appears.

An interesting matter that Captain Shortt has brought forward is the periodicity in sound that is heard when a projectile is fired; it is quite new to me and I look upon it as evidence very strongly in favour of the views that he has advanced. Personally, I feel very much obliged to him for opening this discussion and giving us the result of what one can see is well thought-out work in regard to the matter (*applause*).

Professor Greenhill, F.R.S.—Captain Shortt has shown considerable intellectual courage in bringing forward his arguments on this very difficult and baffling subject of drift. I have studied carefully his remarks and I consider that his arguments are quite sound and clear; and that he has provided for us a popular explanation, devoid of mathematical technicalities, of the reason why a projectile deviates from a vertical plain of fire. We who see the thorny analytical difficulties which obstruct the path are more timid in coming forward with an explanation; besides, we are like the daughters of the horse-leech as mentioned by Tennyson—our province consists in "setting the how much before the how;" it is not for us to explain why a projectile deviates to the right; we are called upon to say how much the drift should be by calculation beforehand.

I have made a collection in a volume of all the foreign pamphlets I could lay my hands upon bearing upon this subject; they are not very light reading, and sometimes unconvincing, especially when the author is compelled to adopt some approximations in order to avoid an analytical *cul-de-sac*—another man's approximations always are unconvincing.

We have ventured, sir, to send down again the apparatus that we had before at General Owen's lecture. The curved track that you see before you, on which a gyrostat mounted on wheels is made to run; this time we have borrowed a gyrostat belonging to the Royal Military Academy to exhibit these phenomena on a larger scale and I hope Captain Cooper will show the gyrostat in action at the end of the proceedings. The idea of exhibiting the swerve of the gyrostat on an inclined curve is due to Mr. Smith; we are indebted to him for that idea (*applause*). The apparatus is also useful in other ways, for illustrating, for instance, the struggles which are observed in the bearings of the dynamo on a ship, due to pitching or rolling; and also in showing how it is possible in a

railway train running round a curve for the gyrostatic domination of the wheels to overcome the centrifugal force, so that the train is occasionally found to have run off the inside of the curve.

Captain Shortt might, in my opinion, have elaborated one detail in his arguments by referring the various curves which he has drawn for us to a moving plane which is taken to pass through the centre of gravity of the projectile and to be always normal to the trajectory; so as not to refer the motion to a fixed vertical plane. I think that his arguments concerning the longer time taken by the point of the projectile in describing the part of its path to the right than that to the left, by reason of having to overtake the descending tangent, would have been more convincing if it had been exhibited by curves—the same figures, of course, would serve—but if it were referred to a moving plane normal to the tangent.

Captain Mansell's arguments which he brought before us at General Owen's lecture were very ingenious; he described there, I think, if I remember rightly, the deviating effect due to the vortex that was carried forward by the projectile, but according to my calculations that vortex would have the effect of causing a difference of pressure tending to set the projectile to the left, and such an effect is certainly discernible with golf balls and tennis balls; and also in throwing at the American game of baseball. Another simple apparatus on the table can be made to illustrate this effect and certainly, I think, it is observed, (so I have read) that there is a tendency for a certain amount of drift to the left of the plane of fire at the outset, but that the drift on the whole is more and more to the right, and that is shown in the apparatus. We have a wire to imitate the trajectory with the projectile at the end of it; the wire is passed up the bore of a small model cannon and by twisting the wire we imitate, to a certain extent, the spin of the projectile, and we see that the projectile tends slightly to the left at the first, but afterwards swerves more and more to the right.

Captain Shortt has, in my opinion, sir, performed very valuable service in bringing before us again this very difficult subject of Drift.

THE CHAIRMAN—Captain Mansell, have you anything to say?

CAPTAIN J. H. MANSELL—I am placed in a somewhat difficult position in following after all this talent, sir, but with regard to Captain Shortt's lecture to-night, I cannot quite see why he does not agree, as he says at the beginning of his argument, with one point. He says: "The first motion of the point being to the right therefore is not the reason for drift." I do not follow that argument at all. I think Captain Shortt himself acknowledges that the reason for drift is because the first motion of the point is to the right. Supposing a quarter precession was never completed during the time of flight, the point of the shot would then be to the right the whole time. Whatever the cause of drift may be, we should have the point to the right and certainly longer to the right than to the left, because it never gets to the left. This question of continuous precession going on is, of course, a matter of opinion—I do not myself think that it happens—but that is only my opinion. As to the cause of drift, I think I follow Major MacMahon. He said that the time had a great deal to do with the question with high velocity guns. I think the time has a great deal to do with the question myself (I do not quite know how to put this) and also, I think, that the angle at which the shot is thrown across the trajectory has a tremendous lot to do with the amount of drift.

I cannot help thinking that Captain Shortt rather confuses the terms "rapidity of spin" and "rapidity of precession." The rapidity of precession has a great deal to do with the drift, because of the angle at which we get the shot thrown across the trajectory. This angle, in my opinion, has more to do with the question than the mere comparative times that the point of the shot is to the right or to the left, supposing we get

continuous precessions. Now the faster the spin of the shot the slower the precession. So far as I can make out from Captain Shortt, he came to the conclusion that the faster the spin of the shot the more rapid was the precession. I do not think that it is so at all; I have always understood that the faster the spin of the shot the slower is the precession. You can work it out analytically. It is analytically determined in the 1883 edition of Major MacKinlay's "Text-book of Gunnery" that the greater the spin the smaller the amount of movement for a given impressed force; so that if we have a slower spin the shot will throw itself at a greater angle across the trajectory. I do not enter into the details of the precession, because I think, as Professor Smith says, photography would be a good way of determining it.

There is one other point that I do not understand. Major MacMahon took it up and General Owen said something about it: it is about the straight line trajectory. If there is a straight line trajectory, it seems to me that the point will never go out of it; if you have a straight line trajectory the only one I can understand is firing point blank in vacuo with no gravity. Supposing we do not fire in vacuo, but supposing we fire in the air eliminating gravity, then the resistance of the air will act through the centre of gravity and there will be no gyroscopic effect shown and therefore no precession. That is one point that I object to, if I may say so, on this precession point. There was a good deal of argument based on this straight line theory, and I do not understand the conditions; I do not understand how you can reason from an impossible condition like that.

The reason why I mentioned the point about the rapidity of precession and the rapidity of spin was because of the remarks that Captain Shortt makes about a howitzer fired at high angles of elevation.

I did not quite understand what Professor Greenhill meant about my vortex. The whole drift of my argument was that the shot must go to the left under the conditions that I named. I do not know whether he was under the impression that I meant that it must go to the right.

Captain M. B. Lloyd—When I heard some weeks ago that Captain Shortt was going to give us a new theory on the subject of drift, I must own that I was rather sceptical about it, but when I saw the argument which Major Abdy was good enough to send me, I confess that I could not pick any holes in it at all, so I set to work then and made some diagrams of a 6″ B.L. howitzer trajectory; I thought that, as I could not pick holes in the theory, I might try and put it to a practical test. In Fig. 1* I have plotted to scale the line A B (*describing the same*), which is the trajectory of a 6″ B.L. howitzer with a muzzle velocity of 779 f.s., which is the highest given velocity, and an elevation of 35° 8′. I then calculated from the range-table the lateral acceleration due to drift by taking second differences. That follows this line, C D, that I have shown along *here*. It keeps pretty nearly constant first and then towards the end of the trajectory at D it suddenly shoots up like that. Then from the range-table also I plotted the curvature of the trajectory; it has come out a little bit sinuous, but that is due to the way in which it was calculated. Well, you notice that (except this part of the end here, which I think is wrong) it shows fairly well that the acceleration due to drift varies as some power of the curvature of the trajectory, and so bears out entirely Captain Shortt's argument. I then took the same howitzer, a 6″ B.L. howitzer with its lowest velocity, which is 501 f.s. and at 60° 12′ elevation. This *(pointing to it) a b*, Fig. 2*, is the trajectory; this thin red line, *c d*, as plotted, is the plan of the trajectory with the drift exaggerated about 100 times; this black line, *e f g h*, is the lateral acceleration due to drift—that is very peculiar in this case, as, you see, it comes a long way off the paper *here, f*, and comes back *here, g*; this blue line is the curvature of the trajectory—it is not so sinuous as the other, as I actually took it off the trajectory instead of calculating it from

* *See* plates.

the range-table. In this case you find that the lateral acceleration goes up where the curvature goes up, but when the curvature falls in the descending branch, after what Captain Shortt calls the critical point, the lateral acceleration becomes negative and largely negative, and remains so up to the end of the trajectory. I do not profess to understand it, but that is so.

I hope nobody will get up and say that I have been pinning any faith to the range-table for things for which the range-table was not intended. Everybody knows that the range-tables are made for practical use and not for making mathematical deductions from, but still they are the only things that we have to go upon unless special experiments can be made on specially calm days, when the weather is made to order; and I do not know how we are to get any other data; and although the range-tables are not true to the last place of decimals given, still they are generally true and any deductions that are drawn from them must equally be generally true. I have purposely omitted putting any scale to these curves as that would imply that they were numerically exact, which I do not profess, but only that they show the general track of the flight of the shell.

Captain H. B. Strange—Professor Smith stated that he thought photography would be a good means of ascertaining the position of the shot at different points on the trajectory. I believe, sir, that the Ordnance Committee have taken some photographs of howitzer projectiles in flight and it might be well for anybody who wishes to see them to look them up at the Ordnance Committee Office. Then, though I cannot give you any further details about these photographs, what we have seen at Shoeburyness is the projectile suddenly arrested in flight, and what was very noticeable was the very great inclination at which the projectile strikes the plate—so much so that being manufacturers we had to make complaints that our shot were not given a fair trial. It has been stated in the paper that it would be necessary to have an angle of 10° inclination before it would be visible. I should think that the angle of inclination in striking the plates was quite 10°, which would be sufficient to show clearly on a photograph, these were with 4″ quick-firing guns also 6 and 3 prs. It seems clear that there certainly was precession of the point of the projectile round the trajectory; to obtain the precise range at which the point of the projectile was in the trajectory we had to bring the plates gradually nearer the guns and we found then that the point of the projectile was in the centre at a certain definite distance from the muzzle for each nature of gun; it seemed to be down first of all, then it went up, then came round to the right, as has been described by the lecturer. I think that the fact that it does go round is proved by what I have just described. This motion, of course, was not owing to the air, pressure or curve of trajectory, it was really owing to the way the projectile started from the gun, being unsteady at starting; the current of air would increase this unsteadiness; the range of the armour plates varied, I believe, from 50 yards to 300 yards.

Major P. A. MacMahon—I should like to make a remark about what Captain Mansell said just now. A straight line path in the sense in which I used the term and in the sense in which, I believe, Captain Shortt used it, can be perfectly realised by firing a gun either vertically upwards or vertically downwards; it is not necessary to fire into a vacuum, or to suppose that the force of gravity is annihilated.

Captain J. H. Mansell—I should like to ask Major MacMahon whether when a shot is fired vertically it would precess?

Major P. A. MacMahon—Yes; I think so.

Captain E. S. Cooper—I had hoped, sir, to have some experiments to lay before the gentlemen here. My line is not theory, but practice and experiment, and I think that on a question like this one must fit one's theories to the practice, to what actually takes place. I managed to get hold of General Owen's appa-

ratus that is on the table there to your right that he tried to show off last year, but found out of order; it had not been used since he left The Academy 25 years before. I have been putting it in order and trying to make it work, but I only succeeded in so doing this morning and, consequently, have not fired more than a few rounds from it, so the results that I obtained are valueless, except, perhaps, on one point. The lecturer suggested that he had heard that projectiles when they lose their velocity have a tendency to lose their drift to the right and Captain Lloyd showed the same thing, I understand. That, perhaps, is the only point which I found most distinctly shown by the few rounds that I was able to fire to-day—namely, that if the projectile loses its velocity when fired at a high elevation it not only loses its drift to the right, but drifts most distinctly to the left. I actually obtained a large amount of drift to the left.

Colonel R. W. Rainsford-Hannay—I do not understand the high mathematics involved in the question of drift. My experience with high trajectories and low velocities inclines me to think that up to a certain elevation there is an increasing drift to the right and, as the extreme elevation of the howitzer is approached, the drift to the right gets less and less, and that when the maximum elevation is reached at which you have control over the projectile it gives a swoop to the left and falls a considerable distance to the left of the line of fire. This elevation is, as far as I can recollect, between 57° and 62° with 6″ B.L. and 65° and 70° with 8″ B.L. howitzers. You may, up to that point, have had fair control over the projectile, but as soon as you reach it the projectile becomes wildly erratic, though its general tendency is to go to the left. At least that was our experience at Lydd, and I think Captain Osborn, who was experimental officer there three years ago, can bear out what I have said.

Captain G. Osborn—With regard to that, Sir, I can only say that the experiment has been tried at Shoeburyness as well as at Lydd, after it first had been remarked at Lydd that that was the case; as regards the figures they are somewhat astonishing and, as I believe they have not yet been before the Institution, I may be permitted to mention them. Those to which I refer are from the 8″ howitzer, not the 6″. The 6″ howitzer, it is true, gave suddenly (after 65° elevation was reached) deflections to the left of about 260 yards, so far as I remember; that is only from memory, it might be feet, but I think it was yards; but, as regards the 8″ howitzer, I have the figures[1] fairly in my mind and they

[1] I have looked up some of the extraordinary rounds referred to by Colonel Rainsford-Hannay; they were as follows:—

Weather calm on the day on which the first three rounds were fired, and a light breeze only when the remainder were fired.

Elevation	Deflection	Shell fell left	Charge	Remarks
		Feet	Cordite	
67°	5°	255	$\frac{1}{3}$ + 2 6 oz. rings	
68°	2° 30′	240	,,	
*69°	2° 30′	1320	,,	Blind
59° 10′	5°	All were appr'xim'tely line and range	,,	Seven consecutive rounds were fired
69°	6°	399	,,	
69°	6°	387	,,	
69°	5°	540	$\frac{1}{3}$ + 1 6 oz. ring	Range of this round about 1400 yards

* This round was dug up and found only three feet below the surface of the shingle and *point uppermost*.

It is evident that the long shell, fired at high angles of elevation, with small charges is very erratic. It would be interesting to know what limits there are to the drift of the 4½ calibre 8″ B.L. shell when fired at very high angles with various charges; and very necessary to know the angle of elevation up to which each charge gives satisfactory shooting.

were as follows:—Range, about 2000 yards; time of flight, something over 60 seconds; and the drift was about 1300 feet to the left, suddenly and quite unexpectedly. We were firing, I think, with over 67° of elevation, and, on slightly increasing the elevation to get the range, suddenly we found the shot going 100 yards or so to the left of the splinter-proof, in which were several officers and men. In the shell there was 32 lbs of high explosive, which, on bursting, made a crater in shingle of 50 cubic yards in extent, so that it was rather an important matter.

Captain J. W. Ormiston—I should like to know whether in the howitzer practices that have been referred to by Colonel Rainsford-Hannay and Captain Osborn they were speaking of groups of shots or of isolated shots that fell to the left?

Captain Osborn—A number of shots; they are down in the Ordnance Committee's report.

Captain Cooper and Professor Greenhill *showed some experiments with the gyrostat, etc.*

REPLY.

Captain Shortt—Professor Bashforth gives his reason for drift, that "because the first motion is to the right and afterwards because the point is more to the right than to the left, the drift is to the right." I agree with the last reason, but I have never seen any explanation why it is so before, and that is what I have tried to supply to-day. As General Owen says, in the second quarter, although the point is coming in yet, it is still on the right and the air must be still acting on the left side. That I agree with, of course. He says also that it cannot complete one or more revolutions, that, of course, I differ with and I have shown why; and I think I am borne out by practical results. I think that the noise one hears in flights cannot be due to anything else but that; I never heard any other theory of it.

As regards the position of the centre of gravity, of course if the centre of gravity were right forward or right back, it would make an enormous difference, as Major MacMahon says. For that reason I limited my lecture to service shot. If you put the centre of gravity right forward as it is in a rocket then the projectile will keep point forward almost without rotation at all; but I was limiting myself to the position of the centre of gravity more or less in the middle. The only thing I took my stand on was that the air would drive the point away from the trajectory, and for that the resultant, if you call it so, of the direction of the resistance of the air must act in front of the centre of gravity.

I see, of course, the force of Major MacMahon's argument about symmetry; that certainly did not occur to me, but as the resistance decreases without reference to any particular position of the point, I don't see how it can give the point a bias in any particular direction. It does not affect my argument about the point in a curved trajectory being more to the right, I think.

As regards there being less drift in a high velocity gun, there is also, I think, in a high velocity gun less drift, compared with the time of flight, than in a howitzer. I think I am right in saying that in a howitzer for every second there is considerably more drift than in a high velocity gun.

As to a billiard ball's drift, I do not know, I must say. I had not heard of the theory, and I know nothing about it. That a golf ball drifts only with low velocity, I have seen, and the same with a tennis ball. I may say that I entirely agree with Captain Maunsell in what he said at the last lecture about the

effect of rolling a ball on a cushion of air, the roll would be to the left instead of to the right; but I have noticed with a tennis ball that when you are serving with cut the ball goes pretty straight at first; it is only when the velocity is lost that it takes any drift at all. Whether from that you can argue that with a high velocity there is little or no friction, and therefore little or no either roll or slip I do not know, but it seems rather to point that way; it seems true that the velocity has to drop before the effect can be seen, before drift sets in in the case of a golf ball or a tennis ball, but that, as I say, I cannot speak about for certain.

Captain Mansell talks about rapidity of spin and rapidity of precession. I did not intend to make allusion to it at all. All I say is that whatever the rate of precession is the shot has got to precess faster than the rate at which the trajectory curves in order to get down at all. If it does not precess as fast then the spin will eventually lose control over the point and it will fall further and further back and finally turn broadside and, so far as I can make out, it is only when the shell turns broadside that you get this tremendous drift to the left. I think, Captain Osborn, when the shell is at a high angle and drifts to the enormous amount of 1300 feet to the left it must have been after it turned broadside and not before. Until the shot turns broadside it will have a right-handed drift. Of course when I am talking of not seeing anything less than an angle of 10°, I mean simply when the shot is in flight one is, of course, some way off it, and seeing it at a considerable distance. I daresay if you took the perforation of shot through any substance you might form a closer estimate.

As regards flat-headed shot I do not like to touch upon the subject. In the pointed shot I take my stand upon the fact of the resistance of the air forcing the point away. With flat-headed shot I do not think it is quite decided whether the resistance of the air will force the head of it away or force it back again when it is slightly displaced from the line of motion; but if, as General Owen has said, with this machine it has been observed that the point of flat-headed shot is to the left and the point of pointed head shot is to the right, if the flat-head has its point to the left in flight then there should be left-handed drift, because that means that the precession is left-handed.

With regard to what Captain Mansell said about a straight line trajectory, that was only to simplify the theory for the purposes of explanation. One does not get it unless one does fire either straight up vertically or straight down vertically. That was merely to simplify the explanation at first, to accentuate the difference, to show what would happen if the trajectory was either very straight or very curved. The idea of the shot not completing one complete revolution in its trajectory comes from observing low velocity shell at high elevations, and because it has never been shown that if a revolution were completed that the preponderance would be to the right. This I have proved and, moreover, if the precession do not complete a revolution, there is no explanation of the periodic sound in flight. In low velocity howitzers, on the other hand, a revolution may not be completed, as I have shown above. As regards the quantitative aspect of the question, a mathematical analysis is, I believe, out of the question. An approximation may be arrived at possibly on the lines given us by Professor Boys, but what I have endeavoured to show in this paper is that the point is chiefly on the right and the reason of this, also that the variations due to high and low velocity, etc., vary with the amount of drift and that, therefore, the effect of the point being to the right chiefly must be a large factor in the determination of drift, if it be not the sole cause.

Note.—Captain Mansell states, that the greater the velocity of rotation due to rifling, the slower will the precessional movement be, and that, therefore, according to my paper, the drift ought to be greater. This is perfectly true, and is

borne out in the case of the 8″ howitzers of 46 cwt. and 70 cwt., taken from the text-book of gunnery:—

Howitzer	Elevation	Weight of Projectile	Time of Flight	Drift
8″ 46 cwt.	13° 5′	185 lbs.	9·6	27·6
8″ 70 „	13° 14′	180 „	9·0	18·0

The 46 cwt. gun has a twist of 1 in 16, the 70 cwt. gun 1 in 35, and the drift is very much greater in the case of the one with sharper twist; but, in this case, the rifling is the only factor in which the two guns differ, and the result of the difference of twist is directly shown. Generally, however, other forces come into play, and from a formula Captain Mansell quoted, the time of a complete precession

$\propto$ directly as the angular velocity due to rifling;

$\propto$ inversely as g, which in this case is the retardation to the projectile's flight, and is not, therefore, a constant force;

and $\propto$ directly as A, which is a moment of inertia, and increases largely with the size of the projectile.

Each of these three factors directly influence drift therefore, and it will be seen that, while the angular velocity of rifling varies pretty much with the muzzle velocity (except in the extreme case mentioned above), the second factor—the retardation—varies as the (velocity)^3, so that with projectiles of the same weight the drift will generally diminish with higher muzzle velocities, and the precession be faster.

The third factor shows why drift is so much smaller with small projectiles, as A will increase roughly as the 5th power of the calibre, the drift of a rifle being practically nil.

The Chairman—Professor Smith was asking to-night about photographs of projectiles. It is true that we have photographs of projectiles in the air, but I do not think we have any satisfactory results and it seems a great pity that we should not, because a great many howitzer shells are fired at low velocity at Shoeburyness and elsewhere and it only requires the camera to get a photograph of them. I do not know who is the proper person to start the thing; perhaps the Committee of the Institution might take it up.

Nothing now remains for me, I think, but to thank Captain Shortt for the very interesting lecture that he has given us and for the very interesting discussion which it has led to (*loud applause*).

RAWAL PINDI TO LUCKNOW.

BY

MAJOR J. A. COXHEAD, R.H.A.

Long marches at home being of rare occurrence, the account of a march from Rawal Pindi to Lucknow may be of interest. To save space the account is given in a series of bald facts, without literary embellishment or attempt to make an amusing story.

Length of march.

"B" Battery, R.H.A., left Rawal Pindi on the 2nd November, 1896, and, after staying at a practice camp near Umballa from the 5th to the 23rd December, arrived at Lucknow on the 13th February, 1897. The number of actual marching days was 70, the length of the march 805 miles, and an average day's march therefore $11\frac{1}{2}$ miles; the longest march was $16\frac{1}{4}$ miles, and the shortest $4\frac{1}{4}$ in a ferry train. This appears very short to English ideas, but it is necessitated by the large number of followers who have to go the whole way on foot.

Strength.

On leaving Pindi our numbers were 145 officers, non-commissioned officers and men and 200 followers, public and private; 153 troop horses, and 15 officers' chargers and ponies. We left our 17 War Establishment horses at Pindi for "K" Battery, who left their's at Lucknow for us, our mutual application to march with our own having been refused. I cannot say why, unless it was expected that the batteries would starve *en route* and something had better be saved out of the wreck. On marching in various casualties had changed these numbers to 156 officers, non-commissioned officers and men and 195 followers; 151 troop horses, and 14 officers' chargers and ponies.

Transport.

The transport at starting consisted of 85 camels and 14 bullocks, with 7 carts of Government transport and 70 bullocks, with 31 carts of private transport, officers' messes and institutions having to provide their own transport. This remained about the same, being changed, however, several times as far as Ghaziabad, when we met "K" Battery, who were marching from Lucknow to Rawal Pindi on the 13th January, with whom we exchanged transport, getting for our 85 camels 38 carts with 82 bullocks and 18 carts with 38 mules. The cart transport is the easier to manage, but the camels were very satisfactory on the whole. Occasionally trouble was caused by getting camels only partially trained, and once a section was nearly driven over a precipice whilst crossing a pass through a wild brute getting loose and persistently charging it. The men were soon able to load them very quickly and the battery was able to march 45 minutes after the order to strike the tents, which were of the large pattern called E.P.

System of marching.

The advance party—consisting of the Q.-M.-S., a couple of assistants, commissariat sergeant and agent, bakery and live meat—went on a day ahead of the battery, laid out the camp and made all arrangements for supplies, the civil authorities having been indented on for the same some time previously. There is always great competition for the post of commissariat agent, who is always a native, to a regiment or battery on the march and it is generally supposed to be a very lucrative post. We baked our own bread and killed our own meat, our stock of cattle being replenished from time to time by purchase. The battery having fed, breakfasted and watered, the last just before hooking in, as in the cold mornings the horses will drink but very little, moved off from the gun park from $1\frac{1}{2}$ to $1\frac{3}{4}$ hours after reveille, according to the facilities for watering. The battery invariably marched in service marching-order, except that jack-boots were worn instead of ankle boots and putties or gaiters, and the boots suffered considerably. A feed was carried in the nosebags and about 1000 lbs. of grain in the grain bags on the wagons, so that we were always independent for a day of local corn supply. As soon as we got on to the level roads after Jhelum we marched with four horses only in the carriages, except in the heavy third line in which we kept six. This was, I think, of considerable value to the horses. On dead level roads four horses are quite sufficient and a large number of horses get a complete rest day by day in turn. We found, however, that a team of four could not walk as fast as a team of six, and that 14 minutes was the fastest rate at which one could expect the mile to be done in. Undoubtedly, therefore, a little more strain was thrown on the horses when in draught, but this disadvantage was more than counterbalanced by the extra rest obtained. When the horses had got fit, the rate of marching was fixed at six miles an hour, the walk to be as fast as possible, the trot to be eight miles an hour or 7 minutes 30 seconds per mile. Thus the battery walked one and trotted two miles alternately and had about a couple of minutes to spare in the hour. There were milestones all along the road, so it was easy to keep a regular rate of speed. An interval dependent on the amount of dust and and direction of wind was kept between sections. Trotting long distances with the whole battery up to six miles was occasionally practised, but, although apparently causing no distress at the time, was found to fine the horses down, and, I think, unless required, a battery as a whole should not trot for more than two miles at a time. Marching with no wheel horses in the wheel, or perhaps, I should rather say, with horses other than the proper wheelers in the wheel, was practised, and also with the detachment horses hooked in and no trouble was experienced.

Nature of road.

Between Pindi and Jhelum, six marches, the road is hilly, with stiff gradients, and very rough and sharp. After Jhelum the whole country is a dead level and the khunkur roads are as good for travelling as could be wished for. Besides others, the rivers Jhelum, Chenab, Ravee, Beas, Sutlej, Ganges and Jumna have to be crossed. The Jhelum is crossed on a roadway, a somewhat slight structure tacked on to a railway bridge after this was made, and the battery had to open

out and to avoid being on the bridge whilst a train was passing. The Ganges is crossed by a railway bridge, the battery marching along the permanent way and also, therefore, avoiding trains, whilst the railway bridge over the Jumna has a subway for traffic. The Ravee is crossed by a bridge of boats, which entails slight disquietude amongst some horses. The Chenab and Sutlej are crossed in ferry trains. These trains consist of a number of carriages closely locked to form one long carriage with a little lateral play for turning curves. They are end loaded, bullock carts being driven in without unhooking, but we took the horses out and ran the carriages on by hand. Four trains, each about 150 yards long, carried the whole battery and transport. The Beas is crossed in boats. The battery transport and baggage was shipped in numerous flat bottomed boats, landed and marched across a strip of sand about half a mile broad in the middle of the river, shipped again in other boats, and so to the shore. The arrangements made by the civil authorities for this, and indeed at all times when their assistance was wanted, were excellent, and the march of eight miles, all included, was done in a little less than five hours.

Messes and institutions.

The officers had a double mess tent, which could be used as one or two, a great convenience, as one mess tent is then kept pitched till after breakfast, and then does a double march and the other is found ready pitched on arrival at the next camp. A doctor being attached for the march and, after Ghaziabad, an officer for transport duty ensured a rubber, even if one or two officers were away shooting—a great desideratum. The messing was done by contract and a man was engaged to accompany us with four cows for milk and butter. At the second camp out it was found he had no cows and was supplying us from the bazaar. He left. Milk was then got from the battery goat-man and butter from the capital Government dairy at Alighur, sent at intervals of two or three days to railway stations *en route*. Similar arrangements existed for the sergeants' mess for which, of course, rations were drawn. The coffee-shop we gave to a contractor, but we soon found out that it was no use trying to save oneself trouble ; he was very unsatisfactory and on arrival at the practice camp was turned out and the coffee-shop was run by ourselves. The canteen was kept supplied by the Murree Brewery Company, the beer being sent at intervals to railway stations and carted on between whiles ; the carriage was very expensive, but it paid its way well. A travelling soda-water machine supplied all sorts of aerated waters and was a great boon, but it did not improve the battery funds. A man with a herd of cattle marched with the battery the whole way. The milking was done under European supervision and sold from locked milk cans; this worked well. It is naturally, as a financial matter and the amount of trouble involved, a great drawback to a battery having to start all its institutions at the commencement of a march and give them all up again at the end, but this cannot be avoided when leaving and arriving at stations where there are more than one battery.

Shoeing.

On starting the battery marched in its usual state, having wheelers only shod behind. After three marches it was found necessary to begin to shoe others and a week after starting all the horses were shod up.

On arrival at the practice camp these shoes were removed and the battery resumed its march as at the start and remained so for 14 days, when the shoeing had to be recommenced. Eventually 88 other than wheelers were shod and 21 horses only marched into Lucknow unshod. Rain on the 28th December and 21st January affected the unshod feet at once, though no sound roads could have been more favourable for unshod feet than the one we were travelling on. Before Jhelum no road could have been more unfavourable. If I ever march again I shall shoe up all round before I start.

Clipping. The horses were kept clipped during the march, according to the usual custom in India, but with the hair left on the legs, according to my peculiar custom during the six years I have been in the country. This plan I consider to be both ornamental and useful and it certainly follows veterinary opinion. In the rigorous winter climate of Rawal Pindi I imagine this natural covering to the legs, which are unprotected by blankets or bandages, must have been a great comfort to the horses, but in the mild winter climate of Lucknow it is not so necessary, and as high Royal Artillery authorities out here are averse to the practice, I shall next season make a virtue of, more or less, necessity and sacrifice my hairy heels, unless there is a change of opinion before then, which is unlikely.

Feeding. We started on the regulation ration of 20 lbs. grass, 7½ lbs. gram and 2½ lbs. bran per horse, with 320 lbs. gram extra daily. The weather being hot, the gram was soon found to be in excess and the 320 lbs. gram was changed to 160 lbs. gram and 160 lbs. bran. After 12 days marching the extra gram was stopped entirely and after 22 days marching 80 lbs. extra only of bran was given instead of 160 lbs. On arrival at the practice camp on the 5th December this 80 lbs. bran was stopped and the regulation feed only given till we started again on the 23rd December, when 80 lbs. gram extra was given, and in this manner we fed to the end of the march. Sugar cane, carrots, extra grass, &c., were also given when available, but everything was very scarce and very dear and, with this comparatively small amount of extra food, the number of rupees expended ran well into four figures. One would imagine with such short marches that the ordinary ration would be ample, but the constant change and want of rest takes it out of horses a good deal. The horses arrived at Lucknow in excellent hard condition, fit to go anywhere and do anything, but with terribly rusty coats from the long exposure to heat, cold and dust.

Casualties. The captain of the battery left at Jullundur on the 1st December on promotion. A draft of 33 gunners and drivers joined at Ghaziabad on the 11th January. There were 29 admissions into hospital amongst the Europeans, 12 being cases of the pampered pet of the prurient home purist and one of small pox; the remainder being chiefly ordinary fever cases and 24 of these were sent on to different station hospitals. Amongst the natives one Syce was run over and killed in trying to jump on to the forge whilst on the trot; two broke a leg each. There were two cases of small pox and, of course, several of simple fever and one commissariat bullock driver, whilst lying on the ground, huddled up in his blanket, was shot by the commissariat sergeant whilst loading

a gun, with which to shoot some pigeons, through one of the hammers being defective. The charge shattered one foot and penetrated the lower part of the man's body to such an extent that shot was passed for some days afterwards in the man's stools. Eventually, however, he recovered with the loss of his foot. At the passage of the Beas a bullock slipped and broke a hind leg on coming out of a boat and had to be destroyed.

Amongst the horses there were five simple cases of colic and four of fever; two horses had to be left at Umballa, one with a very badly sprained tendon and the other having fallen and been badly hurt marching into Umballa. This was a very wet march and the road in consequence slippery; three horses fell during it; both these horses have since rejoined the battery. There were three cases of galled withers, two in consequence of the front arch opening and one through carelessness. One occurred on the second march, the 3rd November, and was taken into work again on the 1st April; another was nearly as bad and the third healed quickly.

One Irish mare, who had played with the Woolwich Drag as a two-year-old, hunted regularly with the Hambledon as a three-year-old, came out here in 1890, had speared many a pig, taken many prizes for jumping, &c., and smelled powder at the battle of the Malakand Pass when, in the course of a so-called morning ride from Pindi, she had covered over 60 miles during the day, died of strangulation at Ghaziabad, aged 10 years. She was buried by the battery, who erected over her grave a roughly hewn granite stone inscribed "Our Baby," "B," R.H.A., 13.1.97.

Sport.

The dryness of the year affected very materially the shooting *en route*. An Indian small game bag depends very largely on snipe, and these were very scarce, miles and miles of usually excellent snipe ground being quite dry. Altogether 1420 head were shot, including 110 hares, 7 sandgrouse, 290 partridges, 85 quail, 13 geese, 332 duck, 137 teal, 253 snipe, 6 black buck, &c. Two or three days pig sticking did not produce much sport.

Famine.

To the battery the famine was chiefly evidenced by the high prices, and the miles on miles of usually cultivated ground lying fallow. The Hindoo does not, as a rule, make a display of his sufferings; he prefers to drag himself to a corner and die. It was the common custom, however, for crowds of women and children to sift the horses droppings for undigested grain, which was carried away to be used for food, and occasionally we saw this grain eaten on the spot with no preparation whatever. Sixteen marches from Lucknow we had to change the route, as we heard there were no supplies to be had at all on the original road intended and in two or three cases we had to get supplies sent down by train from big centres.

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WITH THE TURKS.

THE BATTLE OF DHOMOKOS.

BY

MAJOR A. C. BAILWARD, R.A.

Journey to Constantinople.

As the only officer of the Regiment who, so far as I am aware, accompanied the Turkish army during part of the recent campaign in Thessaly, it has occurred to me that some account of my experiences might be of interest to members of the R.A. Institution.

Having obtained the necessary sanction from the War Office, and being provided with the equally necessary introductions, I left London on the 26th April and travelled *viâ* Vienna and Kustendje to Constantinople. On entering the Bosphorus I could not help noticing the apparent weakness of the defences on that side, but it is very possible that the batteries armed with guns of very moderate calibre at the water's edge, which are most *en evidence*, may be supplemented by better placed and concealed ones and by a strong system of submarine mines.

Constantinople.

During the three days that I was delayed in Constantinople I visited the usual sights in the city of Stamboul and did not notice any particular excitement on account of the war; there was an entire absence of any reliable news except such as could be obtained from foreign newspapers some three or four days old and the most absurd rumours were prevalent in the bazaars, such as, for instance, that the English had occupied Crete to the exclusion of the other powers and that an Austrian man-of-war had been sunk by an English one at Salonica. I also took the opportunity of visiting the English cemetery at Scutari. The excellent order in which it is kept reflects great credit on those responsible for it. The almonds, jasmine, banksia roses and lilacs, with which it is planted, were all in bloom, and it would be difficult to find a more picturesque and picturesquely situated garden.

Rail to Salonica.

On leaving Constantinople, on the 3rd May, I was compelled to travel *viâ* Nisch, in Servia, a long and troublesome detour, instead of

by the newly-made direct line to Salonica, which was either blocked at some point or fully taken up in conveying troops and stores to the frontier. I did not consequently reach Salonica till the 6th May.

From Salonica to Elassona.

On the 8th having, thanks to the energy and kindness of the Consul-General, obtained the necessary letter of recommendation to the Mushir (Field-Marshal), Edhem Pasha, from the Mushir Commanding the 3rd Army District at Salonica, I was able to make an early start for Verria, generally known by the Turkish name "Karaferia," the nearest point on the railway to the Turkish base at Elassona. The road by Sorovitch, three or four hours further west, was, however, said to be the best one and that chiefly used for the transport of stores. I arrived at Verria at about 10 a.m. and was fortunate enough again to meet the Swiss Military Mission, consisting of Colonel Boy de la Tour, Chief of the Staff, 1st Army Corps (at Berne); Major Bornand, 9th Regiment; and Captain de Watteville of the Artillery, but in staff employ, who had already been my fellow travellers between Nisch and Salonica and in whose company I remained, to my great advantage, until I left for England after the fight at Dhomokos. We paid the usual formal visit to the Kaimakan and Commandant of Karaferia and, after breakfasting *á la Turque* with these officers, who, like most other officials whom I subsequently met, were only too hospitable, started together with our respective dragomans in three carriages for Elassona and Larissa at about 1 p.m.

Swiss Military Mission

The road immediately enters the mountains and for the first 10 miles surprised us by its excellence, afterwards, however, becoming very rough in places, and we had several narrow escapes of a roll down the hillside. Darkness overtook us some 10 or 15 miles from Serfidjie, the nearest town, and we were obliged to throw ourselves for the night on the hospitality of a local squire at the village of Karanja, who entertained us with a sumptuous dinner at his chateau at 1 a.m.

I should have mentioned that we were lucky enough to have for a fellow traveller the Turkish Consul at Larissa, who was, of course, well known on the road and who made the necessary arrangements for our accommodation.

Next morning we were again under way at 8.30 and soon afterwards, at the junction of the high road from Sorovitch already referred to, we met a Turkish officer sent by Edhem Pasha to meet the Swiss Mission and conduct them to Head-Quarters. Passing trains of ammunition and stores on pack-mules and ponies, we reached Serfidjie at about 1 p.m. and, having called on the Governor of the District (Hifsa Pasha), were again *en route* by 2 p.m. Shortly after we heard of the murder of a Turkish officer with his orderly and the driver of his carriage on the road not far from Serfidjie during the previous night, and the officer commanding a battalion, which passed us when breakfasting by the roadside, was courteous enough to detail a party to escort us for a certain distance on our way; we reached Elassona, however, without any adventure, but in pouring rain, at 11 p.m. The horses were in a state of collapse and, owing to some misunderstanding,

we did not obtain shelter (in the house of a Greek merchant) till midnight.

Next morning, after a more or less peaceful night, during which some of the party were severely mauled by wild beasts, we were on our legs in time to receive that part of our baggage which had followed us on pack-animals from Karaferia and which was, as might have been anticipated, in a hypersaturated condition.

Starting again at 9.30 a.m., on the 10th, we were on the Meluna Pass by 11 o'clock. Here we saw two captured guns of position of about 5″ calibre on overbank carriages and wondered much how the Greeks got them there and what they had intended doing with them. The Turkish officer in command of the post, a good fellow who I heard had distinguished himself in the fighting there, pointed out with some pride the effect of two M.B. shell, fired from the heights above, which had struck the blockhouse on the pass and doubtless hastened the the strategic retirement of the Greek army. Meluna Pass

From what I could gather regarding the relative position and strength of the two armies when war was proclaimed, it appeared to me that the position occupied by the Greeks on the pass itself must from the first have been untenable, having been commanded by higher ground within the Turkish frontier at a distance of about 1200 yards which they failed to capture at the outset—even if they had been successful they could at the most only have delayed the Turkish advance for a time and could hardly have hoped to force a passage through the mountains to the north into Macedonia.

No doubt they were mislead as to the readiness for revolt of the population of that province; so far as I could judge, Turkish rule was not, on the whole, unpopular and at places which I passed through there seemed to be great enthusiasm over Turkish successes and the despatch of troops to the front.

From the Meluna the road descends at once into the plains of Thessaly, at that time covered with corn as far as the eye could see; at the foot of the pass it becomes an unmetalled cart track and continues so, for the most part, as far as Pharsala and Dhomokos; owing, however, to the gravelly nature of the soil, it is in dry weather fairly good going for wheels and even in wet weather (it had been raining for some days previous to our journey) is probably quite practicable for guns.

About a mile south of the pass is a magnificent spring of excellent water of which we took advantage for our midday meal by the roadside.

About five miles further on[1] we entered the small town of Tyrnavos, the first captured by the Turks and taken, so to speak, red-handed and deserted by its ordinary inhabitants. It was not therefore, I think, a matter for surprise that it appeared to have been systematically looted. We entered, from curiosity, one of the houses which, from Tyrnavos

[1] Passing the position of Mati held by the Greeks until the occupation by the enemy of the hills to the west compelled them to abandon it.

the debris of copy-books, &c., with which the floor was strewn, seemed to have been a school. The rooms were filled with an indescribable litter of broken furniture, rags of clothes and bedding, and altogether, with the pretty little garden in the courtyard full of roses and oleanders in bloom, but also littered with rubbish, it furnished rather a melancholy spectacle; the same description would apply to many of the towns and villages which we afterwards passed through; some of the houses had generally been burnt and the timber of others utilised for fire-wood owing to the scarcity of timber of any sort; this, no doubt, was necessary, indeed some newspaper correspondents told me that they had been compelled to help themselves in this way.

At Tyrnavos outside the large barrack square were drawn up seven more captured guns of position, of the same description as those already seen on the pass, also two Krupp Maxim guns of about 200 lbs. identical, I believe, with those with which the Turkish batteries were equipped; the breech-pieces and sights had in all cases been removed, but the guns appeared in other respects to be quite serviceable.

Road to Larissa.

The road from hence to Larissa and the fields on both sides of it were strewn with dead horses, broken carriages, &c. We noticed in particular a great number of regimental caps, perhaps thrown away by the Greeks in their haste to assume, as a head-dress, the more convenient fez. In one place were several ammunition wagons, the shell and shell trays lying scattered round them.

Crossing several somewhat rickety, wooden bridges over small streams or irrigated channels and, finally, the large stone bridge over the river Peneios, which we were told the Greeks had made an unsuccessful attempt to blow up, we reached Larissa. Before crossing this bridge we were able to see something of the fortifications of which much had been said in the newspapers. They appeared to consist of a chain of small redoubts connected, more or less, by shelter trenches and disposed on an arc fronting towards the north-east, the direction it would seem from which an attack was expected, and were all situated to the east of the road from the Meluna so far as could be seen.

Outside the town our progress was delayed some time by our meeting with a brigade of infantry about 3000 strong with a battery of artillery, who were said to be marching to Trikkala.

Larissa.

Entering the town, which was practically deserted by its inhabitants at that time, we were guided to the quarters of Saifullah Pasha,[1] an able and energetic officer who, at the commencement of the war, was serving on the Staff of Edhem Pasha, but was then temporarily appointed Governor of Larissa. Here what we at first supposed to be a formal visit developed into a most convivial dinner-party, which did not break up till very late in the evening, and it was with great difficulty that we succeeded in rousing our dragomans, who had established themselves for the night in the house allotted to us and

[1] Turkish Military Attaché at Athens before the war, his knowledge of the mountains of Thessaly acquired during sporting expeditions is said to have been of great value.

did not apparently expect to see us again till next morning.

On the 11th May we commenced the day by a visit to the hospital of the Ottoman Bank Ambulance, organised by and at the expense of the bank, and were shown round the wards by Dr. Lardy (a well known Swiss surgeon) and Mr. Sandison, a nephew of the British Consul-General at Salonica and Secretary to the Ambulance.

There were then 220 wounded under treatment and up to that time eight deaths only had occurred in the hospital and no amputations had been found necessary; the patients seemed as cheery as possible and were enjoying the, for them, unwonted luxuries of clean sheets and unlimited tobacco; nevertheless, I was told that many of them were only anxious to be sent back to the front again. The officers of the ambulance said that their behaviour under operations was quite admirable. Mr. Sandison, for instance, related the incident of a man suffering from three severe wounds, who, having (as on religious grounds the Turks generally do) refused anæsthetics whilst one wound was being sewn up, noticed a comrade near him in great pain and motioned to the doctor to give him water.

At about 1 p.m. we left Larissa and, passing through more deserted villages, in one of which a terrible massacre of pigs had taken place, entered the range of low hills which extends westward from the Karadagh or Kunnocephalos Mountains; it was in these hills that the action of the 6th May, generally spoken of as the battle of Pharsala, was fought. It would appear that this was in reality a rear-guard affair fought by the Greeks to cover the evacuation of Pharsala and the villages round by their inhabitants, and in which they took up successive positions about Tekke and between that village and Pharsala, finally withdrawing from the latter place during the night unmolested by the Turks. After various delays, due to the ignorance of our guide of the exact locality of the Head-Quarters' camp, we reached Tekke at about 10.30 p.m. and were accomodated for the night in a captured Greek bell-tent (of French manufacture) 20 ft. in diameter.

Action of 6th May near Pharsala.

Head-Quarters at Tekke.

Next morning, the 2nd May, we proceeded to pay our respects to the Field-Marshal, Edhem Pasha, who gave us a pleasant reception and were glad to be able to express our gratitude for the hospitality which we had already experienced. He gave the impression of an humane and intellectual person and in the various appointments which he has formerly held under the Government has, I understand, always been most popular and highly respected by the Consuls and officials of other nations with whom he has been brought into contact. I have since heard his conduct of the campaign blamed as too dilatory, but it is not to be supposed that he had an entirely free hand in the matter and the practical absence of cavalry from the Turkish force hampered him greatly both in pursuit and reconnaissance. No doubt the long interval between the retreat of the Greeks from Pharsala and the next advance of the Turks enabled the former to take full advantage of the naturally strong position at Dhomokos; but it was also necessary for the latter to push forward ammunition and supplies and to elaborate their plans for the attack of that position with the least possible risk of failure.

Edhem Pasha.

Visit to Field Battery in camp.

After our interview with the Pasha we examined the positions of the recent fight, on the scene of which we were encamped, some of the trees near our tent being scored with bullet marks. I had here the privilege of seeing a Turkish Field Battery in camp,[1] armed with six Krupp 8·7^{cm} guns, with three ammunition wagons and was informed that the ammunition carried was 15 shrapnel and 15 common shell with three case shot per limber. Being hurried, I was unable to note any other points of interest; I was not able to see the horses, but on other occasions, when I met batteries of artillery on the road, they appeared to be of a sufficiently powerful stamp and in fair condition; they were, I believe, Hungarians for the most part. The harness seemed of the flimsiest description, but with plenty of spare rope, no doubt, serves its purpose. Pole draught is of course employed.

Distribution of army in Thessaly.

I gathered the following particulars of the distribution of the Turkish force in Thessaly, which consisted of seven divisions as follows:—

1st Div.	commanded by	Hayări Pasha	at	Tekke.
2nd „	„	„ Neshāt Pasha	„	Pharsala.
3rd „	„	„ Memduh Pasha	„	Tatarli.
4th „	„	„ Haidar Pasha	„	Bde. Tekke. „ Elassona.
5th „	„	„ Hakki Pasha	„	Velestino.
6th „	„	„ Hāmdi Pasha	„	Pharsala.
7th „	„	„ Islam Pasha	„	Elassona and communications.

In Epirus two more divisions under the command of Hifsi Pasha.

I understand that the advance was for a time delayed pending the arrival of supplies. The cavalry were said to be very short of horses and, from what I subsequently heard, I believe that not more than a squadron, about 50 strong, was available for reconnaissance duty with each division, and that no such thing as a cavalry division existed. About 600 were employed as orderlies and escorts to the staff, foreign attachés, correspondents, and others.

Tekke to Pharsala.

In the afternoon we left Tekke for Pharsala, only five or six miles distant, passing on the way the shelter trenches thrown up by the Greeks during their retreat across the plain, and the little walls of clods used by the Turks in their advance. A sharp fight took place about the railway station and bridge over the river about a mile north of Pharsala, and it was here that the Turkish advance was checked at nightfall on the 6th.

Pharsala.

At Pharsala we were accommodated in a large house which had been the Head-Quarters of the Crown Prince of Greece and seemed to have been somewhat luxuriously furnished, but in which the "Bashi Bazouk"

[1] I was told that this battery had especially distinguished itself at Pharsala.

had apparently had a free hand for half an hour or so.

Bashi Bazouk.

I think it likely that others have as vague an idea of the meaning of the term "Bashi Bazouk" as I previously had myself. The literal meaning is, I believe, "free head," and they are in fact exactly equivalent to our "volunteers." The greater number of those with the Turkish army in Thessaly were Albanian mountaineers, attracted by the prospect of a rifle and equipment and the possibility of loot. They had lately been incorporated into the regular battalions, but I was told they had no idea of discipline and paid little attention to the orders of officers other than their own chiefs. They were to be distinguished by the white fez which they wore instead of the usual red one and also by their usually fairer complexions and independent manner; some of them were boys of 15 or 16 years of age. I was told that it was part of Edhem Pasha's system to send them first to the attack, following them up by the Redif and, finally, the Nizam battalions, but I cannot answer for the accuracy of this and at the time I reached Head-Quarters they had, as already stated, been incorporated with the regular battalions.

On arriving at Pharsala we at once proceeded to call on the G.O.C. there and were cautioned by his Adjutant-General that we were on no account to wander beyond the outposts.

Here I had the pleasure of becoming acquainted with General Bonkowfski Pasha, a Polish officer in the Turkish service, who had been sent from Constantinople to superintend the hospital and sanitary arrangements of the camp and was then busily employed in organising a hospital preparatory to the next advance.

Ambulance

The officers of the Ottoman Bank Ambulance had also arrived there for the same purpose and a Russian ambulance was expected daily from Volo.

Here we remained till the 17th inst. waiting further events. Having travelled thus far by carriage, it now became necessary for me to find a horse to ride, a very difficult matter in the then position of affairs, and I was much indebted to Hasan Pasha, General of Brigade, an Albanian and a very distinguished officer, who was kind enough to find me a good mount from the cavalry.

I might perhaps mention incidentally that my position in the camp as a British officer wearing plain clothes, and not accredited in any way, was a difficult one for the Turkish officer to understand and one which rendered it less easy for me than it might otherwise have been to obtain information regarding the organisation, &c., of the army. All the other foreign officers in camp were there wearing the uniform and, as representatives of their respective armies, were treated with great consideration and attention by all ranks of the Turks. It was, however, a great advantage for me to be, so to speak, attached to the Swiss Military Mission and through their courtesy I generally had news of what was going forward.

Outposts.

Whilst at Pharsala I one afternoon walked round the outposts, which were placed on the heights immediately south of the town, but did not extend more than a mile from it. The Greek outposts were

said to be on the same hills not more than two or three miles distant. An officer with whom I conversed, and who talked fluently in French, learnt at the Constantinople Military College, complained of the difficulty in managing the volunteers, who, under the recent organisation, had been incorporated with his battalion of regulars and stated that only 200 or 300 of the latter now remained with it.

I also visited one day the Greek "Cathedral," not an imposing edifice, which had also apparently been visited by the Bashi Bazouk in the first flush of victory; the floor was strewn with torn vestments and broken pictures and I noticed a chest which had been broken open and, probably to the great disgust of the breaker, found it to contain only the relics of some Saint, whose bones lay scattered round it. At the time that I entered it a guard had been mounted on the door and the building was itself untouched. On the evening of the 12th I was agreeably surprised by the arrival of three brother officers from Volo, viz: Captain Ryder and Lieutenant Birt, 3rd Dragoon Guards, and Lieutenant Holmes, I.S.C., the two latter, owing to some unfortunate delay about the letters of recommendation to the Field-Marshal which had not yet reached Head-Quarters, were obliged to return to Volo on the 15th, but Captain Ryder joined and remained with our party.

Arrival of more British officers.

On the 16th we had news of an intended advance next day and, leaving most of our baggage at Pharsala in charge of the two dragomans, we started in light marching-order with one pack-animal to carry our blankets, at 5 a.m. on the 17th, to join the 2nd division, which, with the 4th division and the corps artillery, was to march by the main road on Dhomokos.

Start for Dhomokos.

Colonel de la Tour arranged that Major Bornand should accompany the 6th division and that officer, whom, I regret to say, I had no opportunity of conversing with afterwards, must have seen some most interesting fighting in the hills.

Before proceeding further I had better explain the plan of operations of the Turkish army so far as I was able to understand it at the time.

Plan of operations.

The 2nd and 4th divisions,[1] as already stated, moved with the corps artillery (of five Field Batteries and one Howitzer Battery) by the main road on Dhomokos under the command of Neshāt Pasha.

The 1st division advanced on its right, under Haiyāri Pasha, to carry out a turning movement on that flank.

The 6th division, under Hāmdi Pasha, had the task assigned it (which apparently turned out a troublesome one) of marching through the Khassidiari Hills to the immediate south of Pharsala against the Greek right.

The 3rd division, under Memduh Pasha, was sent to carry out a turning movement still further to the east.

[1] The 2nd division had three Field Batteries.

The 5th division was ordered from Velestino to advance and occupy Halmyros so as to threaten the retreat of the Greeks on Lamit.

The 7th division formed a reserve and protected the communications.

About 9 a.m. we found the Head-Quarters of the 2nd division on the main road five miles from Pharsala. The advance was very slow, possibly to give time to a flanking party of about half a battalion sent to examine the hills on its left.

At 10.30, from a ridge near the road, the 1st division could be seen advancing on the right through the village of Bekriler against Tsiola, which was found to be occupied by the Greeks, who, however, withdrew as soon as the Turkish infantry were deployed to attack. They appeared to consist of about a company of infantry and a few cavalry, the latter remaining for a few minutes to cover the retreat of the rest.

At about the same time firing could be heard in the hills to the east, the 6th division being evidently engaged and its Mountain Batteries in action; this continued throughout the afternoon with more or less intensity, the Greeks apparently falling back slowly and disputing ridge after ridge.

The 1st division had meanwhile occupied Tsiola and continued to advance against the village of Velisiades, immediately opposite to them at the foot of the hills. At about midday some Greek troops (cavalry and infantry) could be seen moving out of Velisiades towards Dhomokos along the foot of the hills and the 1st division bringing a battery into action made some fairly good practice, which rather accelerated their movements. The village of Velisiades, however, continued to be held by the Greeks in some force throughout the day, and they afterwards brought a battery (mountain?) into action on the hill above it with good effect, the advance of the 1st division being checked about 500 yards short of it and no further progress being made in that direction.

Meanwhile the advance-guard of the 2nd division, with a "grey" battery of artillery, continued to move slowly along the road, some infantry being extended across it in the orthodox fashion, though without any sufficient reason, no enemy being in view nearer than the foot of the hills, some four miles distant.

Turkish advance—battle of Dhomokos.

Greek guns of position.

At 12.20 a village (Vardali), a mile east of the road at the foot of the hills, was seen to be in flames, showing that the flanking party, already mentioned, had reached this point. The main body of the 2nd division was now advancing down the road in column, followed by the corps artillery, and at 1 o'clock the Greek guns of position placed about Dhomokos opened fire on them at a range of 5000 or 6000 yards, making very long brackets and producing, at all events, considerable moral effect from the uncertainty as to where the next shell should pitch; the intervals between the smoke of the guns and the hurtle of the shell through the air being somewhat trying to the nerves. I

noticed one shell, which happened to be a blind one, pitch on the road apparently in the middle of the column, but, so far as I could see, without doing any mischief. The fire was very deliberate, possibly because ammunition was scarce.

The whole of the infantry of the division, with their ammunition mules, were now formed up behind a rocky ridge about 100 feet high and ¼ mile long, which rose from the plain like the back of a huge fish, opposite the centre of the Greek position and about 2000 yards from it, and which served admirably as a grand stand for attachés and newspaper correspondents during the rest of the day.

Fortunately it did not occur to the Greeks to make a target of it; shell bursting on its crest at this time might have done great execution.

This ridge was too steep and rocky to be made use of by the Turks as an artillery position and in this respect they were at a great disadvantage, there being not a vestige of cover either from sight or fire anywhere within 2000 yards of the Greek position.

At 3 p.m. the Field Battery with the advance-guard came into action at the east extremity of the ridge close to the road and remained there under a heavy fire from the Greek batteries, who must have known the exact range, during most of the afternoon losing considerably, but not so heavy as might have been expected; in this, as in other cases, I saw common shell bursting apparently almost under the muzzles of the guns without doing much damage. Meanwhile other Turkish batteries had come into action further to the rear and to the east at ranges of between 2000 and 3000 yards from the Greek position.

At 3.45 the Turkish infantry, issuing from behind the ridge, advanced in extended order, or rather in no order or formation whatever, to the attack; the plain in front of the Greek position was now dotted over with men moving slowly on through the corn like a swarm of ants and with equal pertinacity, whilst the firing on both sides became fast and furious; little clouds of dust marked the impact of the bullets, like rain drops on a pool, and very soon a stream of wounded began to move back along the road, the bearers being even more exposed than their comrades in the firing line. There was no organised hospital service,[1] and apparently those comrades nearest to a man when he fell carried him to the rear, returning afterwards to the fight or not, as the spirit moved him.

At the same time, from the heavy firing in that direction, the 1st division appeared to be making a further effort against Velisiades, and on the left the 6th division was held in check by the Greeks in front of a spur running down from the heights of Dhomokos towards the north. It was impossible at the time to ascertain the results of the fighting in this direction, but, from what I afterwards heard, I believe that the Greeks, evacuating their positions here at nightfall, enabled the 6th division to advance and rendered necessary the retreat of the whole army.

[1] I saw some medical officers attending to wounded men under fire under some small trees near the road and others behind the ridge, but there was not nearly sufficient for the work.

The artillery on both sides was now firing shrapnel; in the case of the Turks the bursts were so varied that it was hard to see whether the enemy's infantry or guns were their target. Some of the Greek shrapnel burst well, though, owing to the scattered nature of the attack, without any very evident effect.

At 4.15 the Turkish infantry attack was completely checked by the heavy and concentrated fire from the Greek trenches, the men lying down in the corn 500 or 600 yards off and keeping up a desultory fire.

The Turkish batteries on the left now advanced and seven of them came into action independently and in a very irregular line to the east of the ridge and about level with it, at ranges of from 1800 to 2500 yards from the Greek trenches, with the object, doubtless, of supporting the infantry attack.

At 5.20 three batteries made a further advance of 500 or 600 yards under a very heavy fire from the enemy's guns; at the same time two batteries moved to the west end of the ridge and in line with it at the same ranges as before. Perhaps it was intended that these batteries should move sufficiently far to this flank to obtain an oblique fire against the Greek trenches, but this they failed to do and their fire had probably no great effect.

The Turkish infantry being re-inforced, made a fresh effort to advance, but was met by withering volleys from the trenches and again checked.

At 5.45 two guns of the more advanced batteries on the left were temporarily out of action and at 6 o'clock all three of them retired to about their former positions; almost at the same time an explosion occurred in one of the Greek batteries caused, as I thought at the time (and was able to verify next day), by a limber blowing up.

The Turks now made better practice from their artillery and the fire of the Greek batteries seemed to slacken. My impression at the time was that one at least of their batteries retired from its position.

At 6.50 the Howitzer Battery of the corps artillery was brought into action in front of the ridge and commenced firing; I noticed that it was equipped with smokeless powder, but was unable to observe the bursts of its shell; possibly its fire was directed against the guns of position on the heights about Dhomokos.

In the meanwhile the main attack had been practically at a standstill, every attempt of the Turks to advance being met by a very heavy fire from the Greek infantry, who continued at 7.30 to hold their ground, with the exception of one or two of their advanced and exposed trenches.

At 7.40 it was beginning to grow dark and the Turks, again re-inforced, made a final desperate effort, supported by a shrapnel fire from the batteries to the west of the ridge, more dangerous, I should imagine, to them than to the enemy. Only the flashes of the rifles could now be distinguished and when the fire slackened my impression was that the Greeks still retained their positions.

At 8.15 it was quite dark and the artillery was retired a mile or so to the rear along the road, the baggage of the division having during

the fighting gradually accumulated, with ammunition and pack-animals and wounded in rear of the ridge and on the road, a scene of confusion, which can be imagined, ensued.

Our first thought was to seek out the Head-Quarters Staff, but after wandering about in the fields in the dark for some time, in search first of it and afterwards with equal unsuccess of the Divisional Staff, we decided to bivouac near the road for the night and soon afterwards coming across the German and Austrian attachés, who had succeeded in lighting a fire by the roadside, we joined their party and made a frugal meal off Greek brandy (water was not to be had) and a ham which my dragoman had succeeded in buying at Volo. The arrival of various wounded officers and men, attracted by the fire, did not improve the appetite; the German attaché, Captain Morgen, performed the operation with a pair of small scissors out of Colonel de la Tour's pocket-knife of removing the remains of a Turkish soldier's finger (which had been shattered to pieces by a bullet), the man looking on with almost perfect indifference.

Bivouac for the night.

Having paid a visit to the newspaper correspondents, who were encamped in a ditch hard by, and who gave me a single mouthful of dirty water, for which I shall be ever grateful, after removing a few of the more obstrusive clods (we were bivouacked in a ploughed field), I turned in at about 11 p.m. and slept well enough.

At daylight on the 18th it was reported that their right flank having been turned, the Greeks had evacuated Dhomokos during the night and part of that town was seen to be in flames (this, however, might well have been occasioned by the artillery fire of the previous day). I subsequently heard that the Turks had entered it at 4 a.m.

Having adjourned for a time to the deserted village of Vardali, about a mile east of the road where there was a small stream, we made a very superficial toilette and a cup of tea, whilst our orderlies went in pursuit of abandoned poultry, &c., and presently returned with a couple of live fowls and some onions, eating the latter only for their breakfast. The unfortunate horses also enjoyed about half an hour for refreshment on the banks of the stream.

Scene of battle of Dhomokos next day.

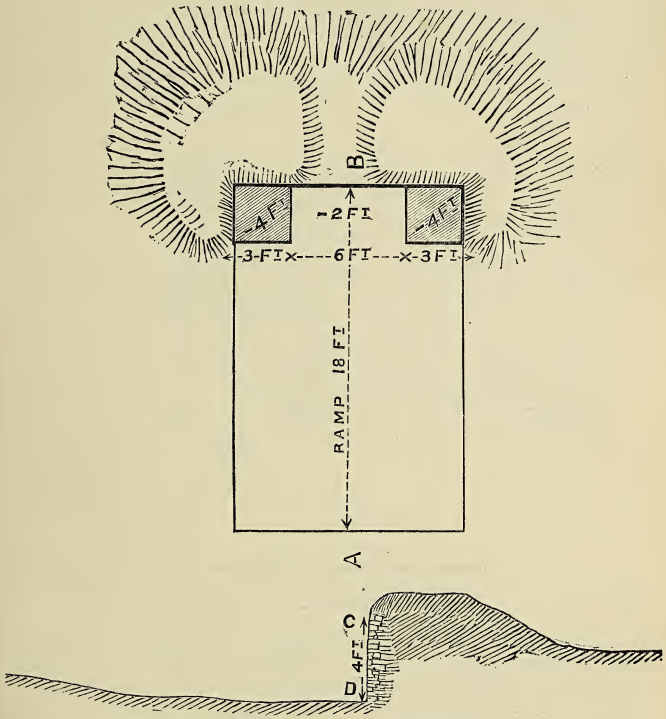
We then proceeded to examine the field of battle, keeping a little to the east of the road over the ground which had been occupied by the artillery, but finding little trace of the fight beyond the carcasses of a few dead horses. The Turkish burying parties were now busy and we able to call their attention to one or two corpses which we came across hidden in the corn. I noticed also a number of dead mules and ponies, no doubt ammunition ones. In one place a Greek trench was being utilised as a grave for 20 or 30 bodies. Altogether on the one line that we traversed we must have seen about 50 dead and at the time I estimated the Turkish loss in this one frontal attack alone at 200 killed and 800 wounded.

Passing some of the Greek trenches near the road, which appeared to me to be admirably made and placed for defence, we proceeded to examine the position of the two batteries of artillery which had borne the brunt of the fighting on the Greek side as far as that arm was concerned.

We found them placed in gun-pits very strongly constructed, the

GREEK GUN-PITS AT DHOMOKOS ON CREST OF ROCKY RIDGE.

The corners deepened to 4 ft. by blasting or picking out rock to form recesses to cover ammunition boxes or detachments.



Section A B C D stone wall revetment.

Section of shelter trench, soil gravel (a number of boxes of ammunition were left open on the step in some of the trenches).

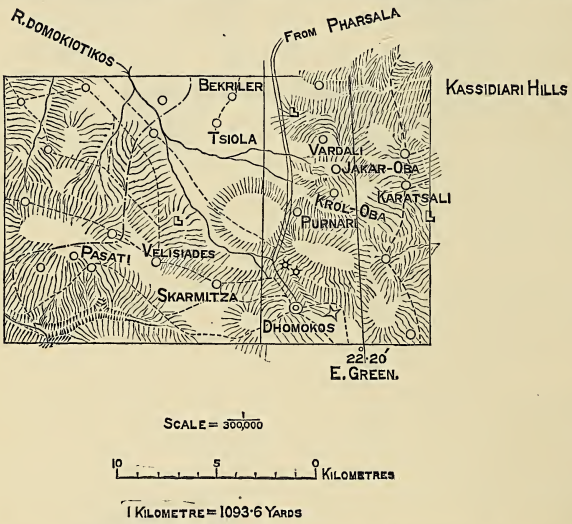
parapets being revetted with stone on the inside and well placed on

the crest of a ridge rising from the road on the east 100 to 200 feet above the plain. Much labour had been expended in perfecting them and making roads into them for the guns.

Greek position.

With the one exception of the ridge to which such frequent reference has been made and which must have served its purpose also as an excellent range mark for the Greeks, these batteries commanded every inch of the dead level plain stretching from the foot of the hills for four or five miles to the north.

The main position of the Greeks seems to have extended along the



foot of the hills between the village of Purnari[1] on the east and Skarmitza on the west for about two miles, a line of shelter trenches barring the main road to Dhomokos which traversed the centre of it. Both these villages were strongly held and in front of Purnari is a low wooded knoll which was also strongly held and which, from its position, gave a useful flanking defence. Two Field Batteries were placed near the centre of the position as already described. In addition the ridges running down from Dhomokos, and connecting the main range of the Othrys with the Kasiadiari Mountains south of Pharsala, appear to have been held on the Greek right and the village of Velisiades, with the heights above it (about two miles west of Dhomokos), on the left.

[1] In this as in other cases I had no means of identifying the names of villages mentioned; those that I have given are, for the most part, taken from the Austrian Staff map. The station of Purnari, however, in this map is almost 3 kilometres further north of that here assigned to it, no village being shown in the map in an exactly corresponding position.

At Dhomokos itself and on the heights round it, about a mile behind the centre of the main position, were placed the guns of position (of which, I believe, three only were in action) commanding the line of retreat of the Greeks on Dhomokos as well as all the approaches to that place from the north.

Position of Greek Field Batteries in gun-pits.

A few dead, with the remains of the wagon of which the limber had blown up, and a considerable quantity of ammunition, were lying in and about the Greek batteries; there were also five or six dead horses lying on the reverse slopes. Behind the batteries were temporary shelters made of brushwood, in which, no doubt, the Greek gunners had bivouacked.

About half a mile further on the road to Dhomokos a culvert had been blown up, but it was avoided by a short detour, easily made practicable for guns; this was not of great importance. On my return in the afternoon I noticed that it had been sufficiently repaired to admit the passage of several Turkish batteries.

All the way to Dhomokos the road was strewn with S.A. cartridge, a great number of which were also left by the Greeks in the trenches, so that they must have been well supplied with ammunition even after the tremendous fire kept up all the afternoon.

East of the town in an open space where artillery had evidently been parked were some abandoned wagons, some of which had been partly destroyed by fire; a quantity of loose prismatic powder (black) was also lying on and about the road.

We now rested for a time at a spring on the road east of Dhomokos. Several battalions of infantry coming up the hill were halted near us and it struck me as a good evidence of their discipline that the men, when forbidden by their officers to make use of the part of the spring near which we were sitting, betook themselves at once without a murmur to another source a little further on.

Hearing that there was likely to be fighting on the Phurka Pass, about 10 miles further on, we started again in that direction, but were soon turned back on the ground that the outposts had not yet been posted. From what I subsequently heard it appears that the force at Dhomokos did not advance further that morning, but that the 6th division pushed on and occupied the pass in the afternoon with little or no fighting.

As it appeared to me that the Greeks were not likely to make any further serious stand, and as my early return to England was necessary, and by going on I should probably have committed myself to remaining with the Turkish army for an indefinite period, I now decided to take the opportunity of returning at once to Pharsala and thence to Volo with the view of embarking there either for the Pirœus or Salonica as occasion offered.

Head-Quarters at Dhomokos.

I therefore called on the Field-Marshal, who had established his Head-Quarters near the old circular fort on the hill above Dhomokos, to take my leave and to thank him for the courtesy which I had experienced from himself and his officers.

Near his tent I saw about 12 prisoners, one of whom was being

examined apparently in German; I was also witness of the spectacle of an unfortunate little pig running the gauntlet under fire from some hundreds of Turkish soldiers on the hillside opposite, about 300 yards off, for the moment successfully; no doubt he met his fate soon after I left.

Return to Pharsala.

Taking leave of my Swiss friends with sincere regret, I started on my return journey, accompanied by one of our cavalry escort.

As I rode down the hill a dropping fire of stray shots could be heard in all directions, it was impossible to say at what, probably at pigs and other unclean animals. Shots could also be heard from time to time about the cornfields and villages as I rode across the plain to Pharsala and one or two bullets whizzed overhead, due probably to the exuberant joy of the Bashi Bazouks over their victory.

I reached Pharsala at about 7 p.m. in company with the French military attaché, Captain Dupont, and the correspondent of the *Journal des Débats*, who had overtaken me on the road; my unfortunate steed had now subsisted for two whole days on a few mouthfuls of grass and green corn and it was as much as I could do to keep him on his legs. I was thankful to get off his back in front of our old home at Pharsala, where I found that our dragomans, notwithstanding the protection of two Turkish soldiers, had thought it advisable to barricade themselves in; my own dragoman, Mr. Bycovitch, however, scoffed at these precautions and attributed them to the terrors of the Syrian Habib, who accompanied the Swiss Mission.

Hospital at Pharsala.

The streets of Pharsala were blocked with strings of mules and ponies carrying the wounded, many of whom lay outside the hospitals waiting for treatment.

Mr. Sandison of the Ottoman Bank Ambulance told me that the two surgeons with him had attended to 150 wounded men, including three amputations during the day. His own brother, who had enlisted as a volunteer under the name of Rustam Bey two days before, had been one of the first to return with a bullet wound, fortunately not a dangerous one, in his arm.

The preparations made by the ambulances, of the Turkish Medical Service, of the Russian Red Cross (lately arrived from Volo) and of the Ottoman Bank, together probably did not provide more than 200 beds and, as wounded continued to pour in, Mr. Sandison had taken the responsibility, for which I hope he got proper credit, of largely extending his arrangements.

Pharsala to Volo.

Meanwhile my dragoman had been fortunate enough to find a carriage to convey us to Volo next day and at 7 a.m. on the 19th we were again *en route*.

The drive to Volo through Velestino is an uninteresting one; only a very few posts of Turkish soldiers existed between those places and it occurred to me that had the Greeks possessed the means and the enterprise for such an undertaking, they might have made a very effective diversion by landing a few thousand troops at Volo to threaten the Turkish line of communications after the departure of Hakki Pasha from Velestino on the 17th.

At Velestino I was unable to identify the scene of the fight there about a fortnight earlier. Coming from the direction of Pharsala it did not strike me that any extraordinarily strong position existed near that place, but probably the fight took place further to the north of the Larissa road. Velestino.

The story of the much talked of cavalry charge, of which, I think, the Turks were very proud, was related by an eye witness in my presence at Tekke.

It would seem that the Greeks held two parallel lines of shelter trenches placed somewhat in echelon, when the Turkish cavalry received the order to dislodge them. Advancing towards their right flank, they received the order to wheel to the right from behind the cover of a wood so as to take the front trench in flank. Instead of this, owing to some confusion of orders, they wheeled to the left and bearing straight down at a very slow pace, the horses being blown, on the rear trench, lost very heavily in men and horses, expecially in the latter, which they were least able to spare.

On arriving at Volo it was somewhat disconcerting to learn that the Greeks had established a blockade there which prevented any of the ordinary lines of steamers from calling.

Fortunately for me I met Holmes and Birt, who had already been waiting there for some days and learning that they had made arrangements for a passage next day to Salonica on board the Italian man-of-war "Etna," I at once went on board and threw myself on the hospitality of the captain, who most kindly allowed me to sail with him, accommodating me for the night in a luxurious manner in the "admiral's" cabin, with which, I understand, nearly all Italian men-of-war are provided.

Outside the Gulf of Volo in the early morning of the 20th we met some of the Greek fleet, who did not, however, disturb my slumbers; and at about 5 o'clock p.m., with the arrival of the Turkish torpedo boat sent to guide us through the defences (real or imaginary) of the harbour at Salonica, my experiences of the Turco-Greek war of 1897 ended.

In conclusion I may be permitted to offer a few general remarks on the organisation of the Turkish army, with the preliminary observation that they represent merely an individual opinion formed under not particularly advantageous circumstances and may easily, therefore, be mistaken in many points. General remarks on Turkish army.

1.—So far as I was able to ascertain there was no regularly organised transport service; fortunately for the Turks the great majority of their men, drawn from Asia Minor and Albania, are born mountaineers and muleteers. It would appear that ammunition and stores, as they arrived by train at Karaferia and Sorovitch, were formed into small convoys placed in charge of detachments of regular soldiers and despatched by road to the army, travelling independently and halting wherever they found convenient on the way; the animals being returned to the base, either empty or perhaps carrying sick or wounded men, for more supplies. The pack loading was generally Transport.

good; the animals were kept in fair condition and I noticed few sore backs and very few dead transport animals lying on the road between Karaferia and Pharsala. The whole of the plain of Thessaly was at this time of the year covered with standing corn and barley seemed fairly plentiful.

Commissariat.

2.—With regard to commissariat, again most fortunately for the Turks, their men are so hardy and naturally abstemious and self-reliant that they may almost be said to exist without commissariat. I believe that the ordinary ration consisted of two or three large biscuits made of coarse flour and weighing about ½ lb. each, but it is doubtful whether they received this amount regularly even in standing camp. It appeared to me that ammunition on the road always took precedence of food supplies and absorbed a large proportion of the transport.

No doubt a considerable quantity of grain was captured in the towns and villages and at Pharsala in particular. There were, I was told, at this place only three mills available for grinding corn, but I have little doubt that the Turkish soldier is quite competent to improvise means for this purpose.

Owing to want of cavalry on the Turkish side, the Greeks were enabled to drive off most of their cattle and sheep;[1] I believe that there was considerable waste and extravagance on entering captured places owing to there being no regular system of collecting supplies.

The crops standing if regularly harvested would, no doubt, prove sufficient to provide for a large army for some months, but I doubt whether a continued occupation would be feasible for anything like the force at present in Thessaly. A considerable quantity of standing corn was being consumed daily by the animals and I do not know whether special orders had been issued for the reservation of certain tracks.

Hospital arrangements.

3.—Hospital: the ambulance arrangements were simply deplorable; there appeared to be very few surgeons belonging to the Turkish service; I could not discover that there was any system of collecting the wounded on the battle-field, or anything corresponding to our bearer companies; I saw no stretchers or ambulances in use and believe that the wounded were, for the most part, conveyed to the base hospitals on ponies and mules, irrespective of the nature of their injuries. No carts of any kind seemed to be available after the fight at Dhomokos.

A considerable number of dilapitated carriages from Salonica and other places were despatched to the front for the use of the wounded (it was in some of these that we travelled to Pharsala) and paid for by the Turkish Government at the rate of 10s. per diem.[2]

There appeared to be very few veterinary officers with the force—I heard of one only with the Head-Quarters.

Physique and general characteristics.

4.—Physique, morale, &c.

The troops in Thessaly were drawn chiefly from Asia Minor and appeared to me, for the most part, to be small, sturdy men who

[1] There were, however, sufficient of the latter left behind to provide for the troops at Pharsala during the feast of Bahrām.

[2] A number of cacolets were captured at Pharsala, but I did not see any in use at Dhomokos.

tramped along cheerfully for long distances under a hot sun, carrying heavy loads of ammunition in two bandoliers, one round the waist and the other over the shoulder, which contained, I should think, nearly 200 rounds, besides their great-coats, water-bottles, &c.[1] Some of the Nizam regiments were armed at Dhomokos with the small-bore Mauser rifle and the rest with the ·37 Mauser. The Redifs and volunteers were, for the most part, armed with the Martini-Henry; I was told that about 3000 of the latter were issued with Gras rifles captured from the Greeks. I was unable to comprehend the "new organisation" talked about at the Head-Quarters; it appeared to consist of the mixture of Nizams, Redifs and volunteers in one battalion, but I could gather no details.

Possibly it was devised with a view to keeping the Albanian volunteers more under control, but it did not apparently meet with great success.

It is unnecessary for me to refer again at length to the fighting qualities of the Turkish soldier; I cannot imagine that he would ever run away, though he might sit down and wait for a long time during the attack of a position.

There seemed to be no attempt at a formation in the attack on Dhomokos and there can have been little or no control over the fire, every man sitting down and firing or moving on, as the spirit moved him, until all gradually accumulated at a point 400 or 500 yards from the Greek trenches, from whence they kept up a tolerably heavy, though intermittent, fire.

Artillery

With regard to the artillery (to which some reference has already been made) it was unfortunate that I was unable to make any notes of interest with regard to the fire discipline (if any existed) or working of the Turkish batteries in action at Dhomokos. I had unluckily lost my field-glasses a few days before and was obliged to depend on the hospitality of my friends for the occasional use of a pair. So far as I could see, batteries came into action independently, though there were at one time seven or eight, more or less, in line; no battery moved faster than at a walk across country, indeed I suspect that the attempt to do so might have resulted in more delay for the repair of harness; I once or twice saw batteries trotting for a short distance on the road.

The fire was very slow, probably never more than a round a minute on the average; with three wagons only, I do not suppose that the ammunition would have admitted of a higher rate. I on one occasion noticed some wagons going to the rear, presumably to refill their trays.

Once or twice salvos were fired by batteries, I do not know whether with any particular object.

No doubt some system for the communication of range and fuze

[1] Their uniforms were generally of a rough description, but serviceable, being made up, for the most part, of a coarse brown frieze; the lower part of the leg and foot were enveloped in woollen bandages and a rough sandal consisting merely of a piece of hide worn laced over the foot. This gave excellent results and the men were able to improvise a new pair of boots in a few minutes from the hide of a dead horse. The fez is not an equally comfortable head-dress, giving no protection to the eyes from the sun, but is, at all events, simple and portable.

existed, but I was not near enough to distinguish this, nor could I in any case, ignorant as I am of the language, have understood what was going forward in this respect.

Behaviour of Turkish soldiers in the field.

Many contradictory reports have been circulated regarding the general behaviour of the Turkish soldiers in Thessaly; so far as my personal acquaintance with them went, I found them honest, simple fellows, very patient under privation and discomfort and always good tempered. I can quite imagine that there must have been black sheep amongst them and do not suppose that discipline was always strictly maintained amongst the volunteers, who were mostly lawless Albanian mountaineers, attracted by the prospect of plunder and rifle.

The country when I passed through it was entirely deserted by its inhabitants, so that it is impossible that they should have suffered any personal outrage or violence. It appears to me very natural that, under the circumstances, houses should have been plundered and in some cases burnt, but in the case of Larissa in particular the chief mischief was done by the convicts liberated from prison by the Greeks on their retreat from the town and also by Jewish inhabitants who remained behind for the purpose, and this may well have have been the case elsewhere.[1]

It was, I believe, the case that few if any wounded prisoners were made by the Turks, but this may be explained by the fact that after the principal actions the Greeks had ample time to remove any seriously wounded, whilst the dread of falling into the hands of the enemy doubtless lent wings to those only slightly injured.

It was from the commencement of the war part of the Greek policy to set on foot rumours of atrocities perpetrated by the Turks with a view to gaining the sympathy of the emotionally-minded to their cause.

Railway—Volo to Kalabaka.

The railway from Kalabaka, through Pharsala to Volo, a single narrow gauge line, was rendered useless to the Turks by the Greeks having accumulated the rolling stock and disabled the engines before evacuating Volo; one engine was, I believe, repaired sufficiently to run a train before I left Volo for Salonica.

Officers.

I find that I have omitted to make any general reference to the officers of the Turkish army. From what I have read and heard of former campaigns, it appeared to me that a very great improvement in professional knowledge and attainments must have taken place of late years. Amongst the higher ranks that jealousy which was so fatal to the Turks in the Russian war of 1877 had apparently ceased to exist and, so far as I could judge, perfect harmony in carrying out operations had taken its place. It would be an absurdity for me to attempt to criticise the conduct of particular officers, but the names of Hāmdi Pasha, Commanding the 6th Division; Riaz Pasha, Commanding the Artillery; and Seifullah Pasha, of the General Staff, were universally mentioned as being officers of great activity and promise.

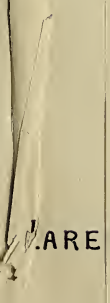
An impression seemed to have existed that a number of German

[1] The desecration of the cathedral at Pharsala, to which I have alluded to, might well have occurred in this way.

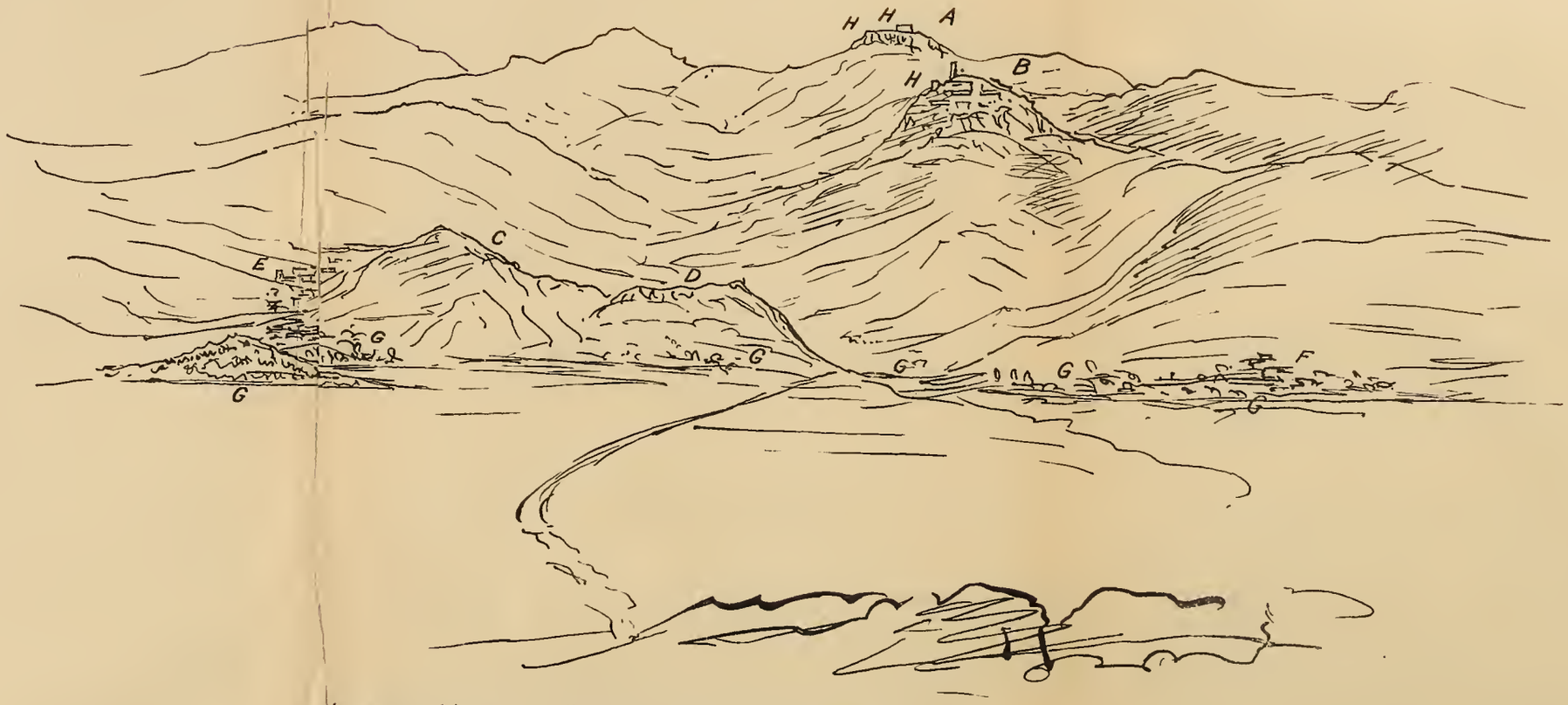
FR

FROM RIDGE W. OF BEKRILAR GENERAL VIEW OF DHOMOKOS.

II



A. _ Old Fort above Dhomokos.
B. _ Town of Dhomokos.
C. _ Greek F. Battery in Gun Pits.
D. _ do do
E. _ Village of Purnari.
F. _ Village of Skarmitza.
G. _ Greek shelter trenches.
H. _ Guns of Position.



Nearer View of Greek Position from Ridge.

III

POSITION ABOUT 6 P.M.

officers were serving with the Turkish army during the war; if this was the case, I can only say that I did not see any of them to my knowledge.

The organisation of the army before the war and its rapid concentration on the frontier were no doubt partly due to the system introduced by Von der Goltz Pasha, who, I believe, returned to Germany some time[1] before the war broke out; and the training of the artillery to Grumbkoff Pasha, who was not, however, allowed to accompany it in the field.

A large number of officers had visited France and Germany for instruction in military matters and many others had learnt French and German at the military schools of Constantinople and no doubt, at the same time, studied modern tactics in those languages.

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1 Nearly two years.

WITH THE GREEKS.

THE ARTILLERY AT DOMOKOS.

BY

MAJOR C. E. CALLWELL, R.A.

In appearance the battle of Domokos was one in which artillery played a very prominent part; and, as the expenditure of ammunition on both sides was considerable and as a large number of guns came into action, some notes on their performances may be of interest. Long accounts of this combat have appeared in the newspapers, but the writers very properly avoid questions of technical detail which are of little interest to the general public. The artillery was upon the whole a failure. But its want of success is traceable to preventable causes and, on this account, there is something to be learnt from the conduct of batteries which might have played a very important part in deciding the issue.

From the nature of the ground there was an admirable view over the field to be obtained from many points within the Greek position. We—I was with the Greeks and one naturally identifies one's self with the side of which one follows the fortunes—had five batteries in position and also three guns of position; these latter were Krupps, on overbank carriages and about 25 prs. Three of the batteries were, I think, mountain batteries and two were field batteries, but it is surprising how difficult it is to distinguish one from the other at any distance on rocky ground patched with dark green scrub. They were scattered about on knolls and spurs a considerable distance apart and they worked quite independently. Two or three field batteries were kept in reserve, apparently because it was thought that no place could be found for them, although there were many excellent positions available easy of access to any battery of moderate mobility.

The greater part of the Turkish army, and the whole of the Turkish artillery as far as I could see, was down on the plain of Pharsala and the Greeks had all the advantage of position for their guns. Their batteries were posted on ground varying in different cases from 200 to 600 feet above the plain. One 25 pr., which was fairly well in the line of battle, was probably 800 feet above the plain, and the two others, which were perched on commanding summits in rear of the

Greek position and dominating it, must have been firing down on the enemy from a height of over 1200 feet and at a range of fully four miles. Down below, on the great green expanse of level ground, every hostile gun could be discerned and every movement noted. Shell bursts were easily detected by the observers, and ranging was thus carried out under quite abnormally favourable conditions. Moreover, the Greek artillery was posted on ground which must, in some cases, have made it very difficult for the Turks to see the batteries or to get their range rapidly. None of the batteries moved during the battle as far as I could see.

The Ottoman army had altogether about fifteen batteries in action and ten or twelve of these formed one long line facing the centre and right centre of the Greek position. Although the limbers and horses were easily discernible through binoculars, I could make out no horse artillery, of which, however, two or three batteries were probably present. There seemed to be no proper concentration of fire, although the guns were massed, and the batteries appeared to move short distances from time to time rather aimlessly. At the commencement of the cannonade the hostile artillery was for the most part about 3500 yards away from our front line, but it gradually approached to an average distance of perhaps 2000 yards. I saw no battery attempt to come to close range in support of the infantry attack upon the centre.

The most noticeable point about the artillery in this action was the very insufficient use made of shrapnel and the very inaccurate bursting of this class of projectile when it was used. Both sides appeared to consider common the proper projectile to fire at artillery and to reserve their shrapnel for the infantry of the enemy. The Greek 25 prs. had no shrapnel in their equipment. Except in the case of the two most advanced batteries, which were right in the centre and which suffered loss both from musketry and from shell fire, I did not see a single shrapnel burst anywhere near Greek artillery. On the other hand, plenty of common shell[1] fell about our batteries but did practically no damage; one of them struck a limber which blew up with a loud report, but all the others seemed harmless. It was surprising to see shells—probably all 12 prs. from the Turkish Krupps—burst right in a crowd of men and horses and do no injury.

Although the Turks made no serious attempt to concentrate the fire of their mass of guns on any particular point within the Greek lines their fire was evidently well under control. For, while their batteries were being annoyed by fairly well directed shells from the commanding guns on our side, they confined themselves almost entirely for fully two hours to bombarding the shelter trenches which the infantry later on attacked. These shelter trenches were well constructed and the Greek infantry and the Garibaldians occupying them did not suffer heavy loss from the enemy's artillery, but the moral effect of the frequent bursting of shells among the rocks and bushes and sometimes actually on

[1] It is possible that some of the shells which burst on impact were shrapnel which had failed to burst in flight.—*C.E.C.*

the epaulments was appreciable. Still when the Turkish infantry eventually attempted to rush the trenches in somewhat unceremonious fashion the defenders were quite equal to holding them and to driving back the assailants with very heavy loss. Had a really well directed shrapnel fire of the 40 or 50 guns which could easily have been brought into play been delivered against a stretch of the Greek front line, it is quite possible that an assault on it might have succeeded in spite of the terrain so greatly favouring the defenders for these were covering far too great an extent of ground.

Statistics will probably appear in due course of the percentage of wounds on the Greek side from artillery as opposed to musketry fire. A Danish officer gave me the figures as they stood prior to the battle of Domokos, but I have lost them; they were, I think, about 30 shell and shrapnel bullet wounds out of a total of about 400. I saw two or three bad shell wounds at Domokos, but did not come across a single case of a shrapnel bullet. The fact is that in this campaign the gunner was not a success, although the material used on both sides was good and decidedly in advance of anything that has been placed in the field in any previous European war.

Colonel Marshall and his merry men have a dummy battery at Okehampton on a hanging spur with a small ravine behind it, and the difficulty of ranging on this has worried many a major. The majority of the Greek batteries must have presented just this same difficulty to the Turks. They were on knolls at the extremity of great rounded spurs. The ground fell a little in rear of them, allowing limbers, mules, &c., to be completely concealed from view and generally to be quite sheltered. Owing to the high ground behind, none of the Greek guns can have shown upon the sky line, except the two 25 prs. in rear which were entirely beyond the range of the Turkish field guns. I happened to be going over to the advanced 25 pr. just when one or two of the hostile batteries suddenly took it as their target, and it was interesting to watch their efforts to find the range. The first shell came whizzing overhead and dropped into a squadron of cavalry near the Pharsala road, about 250 yards in rear of the gun and at a considerably lower level. The next, evidently at 100 or 150 metres less range, fell on the road among some wounded who were being brought up and about 100 yards in rear of the gun at a great angle of descent. Neither of these projectiles did any real damage and the bursts must have been quite invisible to the battery firing them. Then a lot of range must have been taken off, for the next shell burst on the steep forward slope in front of the gun and a long way down the hill. After this the enemy "crept" up the hill very deliberately. Some of the shells were blind and eventually about the tenth shot was unpleasantly near range. However, for some reason no more shells came for some time and the hostile battery or batteries had probably been switched on to some other object.

One does not recognize from Okehampton experiences or from an ordinary field-day that in the artillery fight it is most difficult to tell where the shells are coming from. There is a great line of hostile guns

puffing away and in the smoke and noise and excitement one finds it by no means easy even to distinguish between the bursting of shells (especially shrapnel) and the discharge of guns in the enemy's line. There is a certain advantage in this where, as was the case with the Greeks, each battery commander selects his own target, because he is not tempted simply to take on the battery which is firing at him and the damaging of which may not be a matter of much importance. In the case of the 25 pr. above-mentioned it was thought that the Turkish battery which the gun was making rather pretty practice at was the one that was firing at us, but it seemed to me from the line the hostile projectiles were taking that we were being bombarded from quite another direction.

In a general engagement like this it is very difficult to tell what targets one's own batteries are firing at without going into them to see. Quite early in the action, when the canonade was only partially developed, the 25 pr. perched upon a rocky summit in rear of our right centre was firing right over our heads; but, although I watched most carefully, I could not make out where its shells went to. Of course the time of flight had something to say to this, as the gun was firing at very long range. Later on, when some 120 guns were all blazing away for all they were worth, one could, through binoculars, see shells bursting in a Turkish battery but would not be able to tell from which of our batteries they came. There was some lively shrapnel fire as the hostile infantry was deploying for attack on our centre and, looking on from half-a-mile or more in rear of the Greek infantry and looking right down on the plain, it was difficult sometimes to tell if a puff was a Greek shell or a Turkish shell; the shooting was, however, very wild at this time and either the fuzes were untrustworthy or else they were set very irregularly. There is a kind of idea that a brigadier commanding nine or twelve batteries in action would be able to send a galloper to one of them to say that its shrapnel is bursting all wrong, or something of that kind; in point of fact, he can seldom tell what any one of his units is doing unless he is actually with it, and he will only have a very rough general idea of what his guns are firing at, unless he tells them exactly what their target is to be or unless he makes enquiry.

Looking at it from the gunners' point of view, this fight at Domokos shows the absolute necessity of plenty of practice, carried out under careful supervision, if artillery is to be of any use. The Greek artillery off the battlefield is not at all to be despised and is steady and well-disciplined in action. I was in Athens for several days a few years ago and saw how carefully the field batteries were drilled on mounted parades. The harness is well put on; the horses are wiry and well looked after; the officers are the pick of the army. The contrast between the artillery bivouacs and those of the other branches of the service was extraordinary during the campaign. I should add that the mountain batteries also gave the impression of efficiency. And yet, fighting under extraordinarily favourable conditions, the Greek guns did nothing, because they depended chiefly on common shell and because when they used shrapnel they could not manage it. Greece

is a poor country and cannot afford a large expenditure on practice ammunition; but one battery thoroughly trained to fight is worth two which are only good for show "when the guns begin to shoot."

I do not know what the expenditure of ammunition was, but, as the action lasted about seven hours and as the batteries were hard at work all the time, it must have been heavy. A field battery which had fought near Larissa and under General Smolenski at Velestino had fired just short of 1000 rounds; it was, I think, in reserve at Domokos. One of the mountain batteries had fired 900 rounds before the battle.

Looking back to it now, it seems as if there were a hundred points which should have been noted and inquired about by anyone with his wits about him; but the fact is that on a great day like this one forgets one's note-book and one's science and one's theories. There must always be something intensely dramatic about a combat in which 80,000 men or more are in the field, but at Domokos the circumstances were quite exceptional. The scene looking down from the Greek position was magnificent, not even the famous knoll at Sedan, where the King and Bismarck and Von Moltke surveyed the French collapse, can be compared to it. The situation was one quite out of the common; it looked as if the hostile swarms coming at us would end by shutting us in and forcing a surrender. There was something uncanny about the feeling that the enemy was working round our flank, and not knowing how far he had got. And when officers gather round and vainly try to conceal their anxiety as they ask how the day is going, when a soldier with his foot shot off is carried by you shouting "Zito Polemos," when the guns are speaking, and when the Osmanlis sweep forward like a wave across the plain to break as a wave does when it feels the beach, tactics and text-books are "off," only to be remembered again in the night watches as we defile—some fifty or sixty thousand of us, troops and terrified fugitives from abandoned villages—into the ravines of the Othrys mountains, thankful for the full-faced moon which lights us on our weary way.

The Turkish gunners put in one most excellent bit of work, which, although I did not witness, I can fully appreciate from having carefully observed the ground. During the night following that which the Crown Prince's army passed in retreat to the Furka Pass the Turks somehow got two mountain guns on to some height which actually commanded the col. A Greek officer who was wounded at this time told me the effect of the appearance of this artillery at dawn was tremendous, as indeed it must have been. These two guns in themselves, owing to the way in which they must have imperilled the Greek retreat down the road as it zig-zags along the hillsides to the plain of Lamia, probably compelled the abandonment of the Othrys mountains. But only one outsider, the correspondent of the *Daily News*, witnessed the last few hours fighting of the war as far as I know, and I have never been able to form a very clear idea of what actually happened.

The late campaign has been instructive chiefly in a negative sense. It teaches us what we ought not to do rather than what we ought to do. A bad army was beaten by another bad army which was a great

deal bigger. I do not believe that either as regards organization or its equipment the Turkish army was much better than the Greek. At Domokos the handling of the Turks was certainly no better than that of their antagonists. The Ottoman advance across the plains of Thessaly was remarkable for nothing except its deliberation. The Osmanli soldiery are, no doubt, excellent; but, properly led and fed, the Greek will fight too and is more intelligent and more dashing than his hereditary foe. The one notable feat of arms performed by Ottoman troops in the five weeks was the rapid advance of a large part of Edhem Pasha's army to the Othrys mountains on the morrow of the severe day of Domokos. None of us spectators were prepared for this after previous performances and so we missed seeing some very interesting operations. When the Turks got to within sight of Lamia they had very nearly reached the end of their tether; forcing Thermopylae and the neighbouring defiles would have proved quite a different task from anything which they attempted in the war except their disastrous frontal assault on the shelter trenches below Domokos.

The very feeble results obtained from common shell, even when well directed, in this war (for I understood from correspondents who had been at Mati, Velestino and other engagements that this was as noticeable on previous occasions as at Domokos) prove that we have been right in letting this form of projectile drop out of our field and horse artillery equipment. Actual warfare has, in fact, proved the correctness of deductions drawn from practice made in peace time. We hear a great deal about the moral effect of artillery fire, but one soon gets used to common shell which do no harm. We have always been in advance of foreign countries in our appreciation of the value of shrapnel. But, after the late campaign, it is not too much to hope that all armies which can afford the change will relegate the common shell of their mobile batteries to museums or else send them back to foundries to be converted into some more useful warlike store. Of course these remarks do not take high explosive shells into consideration.

THE NILE CATARACTS.

BY

MAJOR-GENERAL SIR W. BUTLER, K.C.B.,

COMMANDING SOUTH-EASTERN DISTRICT.

(A.-A. and Q.-M.-G. for Boat Service, Nile Expedition, 1884-85.)

(A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 18th March, 1897.)

MAJOR-GENERAL J. F. MAURICE, C.B., IN THE CHAIR.

AMONG all the rivers of the world the Nile may fairly claim to be the most celebrated. Its name goes back in the history of man further than that of any other river; in fact it was long known by the simple appellation "river." When people wished to speak of other rivers they put names to them, as the river Jordan, the river Tiber, just as to-day, when Western Americans desire to specify various wines they say Port wine, or Sherry wine, or Madeira wine, but when they invite you to take Champagne they simply call it "wine"; the illustration may appear somewhat wanting in dignity, and perhaps I should apologise for using it.

Nor, if we reflect a moment on the nature of the Nile, as compared with any other river that is known to us, can we wonder at its celebrity among the early nations of the Mediterranean. 2500 years ago Herodotus wrote that "Egypt was a present from the Nile." That was literally and soberly true. Not only has Egypt been made out of the sand and silt of the Nile, but Egypt owes its yearly, its daily, life to the continuance of that river.

Take away this life-giving water even for a single year, and man, beast, bird, fish, must disappear. It is this one principle of life, made always present through every sense to man in Egypt, that gives to it a meaning of home, food, and even raiment, which is nowhere else found associated into a single object, but is in other lands divided or diffused over a hundred objects. Nor is that all—everywhere else in Egypt, except where the Nile water flows, man sees the evidences of pitiless surroundings; the sun blazes above him, the desert is on every side of him, the wind often comes with the furnace breath of the hot

and fevered wastes, the sky is almost rainless, these things are death. It is the Nile alone, by its never failing munificence, gives life and shade, and sustenance to every living thing.

But "the present of Egypt," which the old historian said the Nile had given, has meant a good deal more to man than the length and breath of the land that is watered by the river. It has meant his earliest civilisation, his first conception of the arts and sciences, his laws, his knowledge of justice. This has been the cradle of human thought. Rome borrowed from Greece, Greece from Egypt, and Egypt found in the waters and mystery of the river the fount of inspiration. I say the mystery of the river, for the things which are regarded by us in the light of peculiar characteristics were, to the ancients, mysterious.

And yet the ancients knew a great deal about the Nile which we have only recently found out. They placed the sources of the river in the 10th degree of south latitude in a range of mountains which they call the Mountains of the Moon, but about 200 or 300 years ago, the child of that period, who had not a long time before become possessed of a new toy which he called type, or printing, imagined he could teach his parents many things, and among this new-found knowledge was the source of the Nile which he fixed in the 12th degree of north latitude, cutting off at once about 1500 miles or so of the river's length; but, as you know, the experience of recent travellers have set back the sources of the river, and its furthest south is now supposed to lie in about the 4th degree of south latitude, not so distant from where the old geographers declared it to be. Again in the matter of cataracts, the modern world having found Niagara and other great waterfalls in the western world, began to pooh-pooh the cataracts of the Nile, declaring them to have been much overrated; but if we examine what the ancients really did write about the Nile cataracts, we find that there was no exaggeration whatever either as to the volume of water or the steepness of the obstacle. Senaca thus wrote of the Nile cataracts:—

"This river, which at first glided smoothly along the vast deserts of Ethiopa, before it enters Egypt, passes the cataracts. Growing on a sudden, contrary to its nature, raging and violent in those places where it is pent up and restrained, after having at last broken through all obstacles in its way, it precipitates itself from the top of some rocks with so loud a noise that it is heard three leagues off.

"The inhabitants of the country accustomed by long practice to this sport, exhibit here a spectacle to travellers that is more terrifying than diverting. Two of them go into a little boat, the one to guide, the other to throw out the water. After having long sustained the violence of the raging waves, by managing their boat very dexterously, they suffer themselves to be carried away by the torrent as swift as an arrow. The affrighted spectator imagines they are going to be swallowed up in the precipice down which they fall, when the Nile, restored to its natural course, discovers them again at a considerable distance on its smooth and calm waters."

Here then we have an exact picture of a Nile cataract. They are

slants of water down which, amid all the fury and turmoil of the raging river, a boat can live.

Neither is the force and violence with which the pent torrent rushes down these rocky slopes at all exaggerated.

It is difficult to imagine a more resistless impression of water power than that which is to be seen at any of the Bab el Kebirs or Big Gates of the cataracts between Wady Halfa and Dongola, and still more in the long series which intervene between Dongola and Abu Hamed.

But whether the ancients were, or were not, extravagant in their ideas of the dangers of the cataracts, there can be little doubt that they understood the use to which the Nile could be put better than we understand them to-day.

All the wonders of old Egypt were the work of the Nile; the pyramids were built by the river, and could not have been possible without it; the gigantic stones were hewn by the shores of the river when it was low, and floated on rafts to the site of the colossal works when the water rose in the inundation. The obelisks which now adorn the squares and central places of the capitals of the world were quarried at Assouan, on the edge of the first cataract, and thence floated off to Thebes, to Memphis, or the Delta. The cities of Egypt, even as late as the fifth century before our era, were reckoned at 20,000. Alexandria, under the Ptolomies, had a population of two million souls; the Egyptian army numbered 200,000 infantry, 40,000 cavalry, 300 elephants, and 200 chariots. In the navy, which numbered 112 vessels of the largest class, there was one ship which was 420 feet in length, and 45 feet in beam. But perhaps the most extraordinary proof of the greatness of old Egypt, and of the sense of justice which pervaded her governing powers and financial authorities, was the fact which we are told on the authority of a most veracious Roman historian, that the daily pay of an officer in the Egyptian army was £3 17s. 7d.; unfortunately, we are still in the dark as to what his mess and wine bills may have been.

Well, although this magnificence and opulence has long ago vanished, and Egypt has become the mightiest ruin on the earth, there are still connected with the Nile so many strange facts and peculiar phases that make it still what a learned French historian described it 150 years ago, "a wonder so astonishing in itself that it has been the object of the curiosity and admiration of the learned in all ages."

Dealing with it in its physical aspect, we are struck with certain facts which mark it as different from other rivers. It had once seven mouths, now it has only two, and although these mouths have been longer known to man than those of any other river, it is doubtful whether the real source of the extreme head has yet been discovered.

The river in its general course has few bends, usually pursuing a channel which is visible for miles in immense reaches; but it has the biggest bend of any river, flowing almost back upon its original course at Abu Hamed to Debbah, where it again turns north; but perhaps its strangest feature is that for the last 1800 miles of its course, the further it is ascended the larger it becomes, and that peculiarity

is easily explained. In that last 1800 miles of its course it receives no tributary stream, it flows, in fact, through a rainless region, but all the way through that desert region it is losing water, the sand and the sun are sucking it out of the broad channel, and by the time it reaches Egypt it has nearly lost one out of every three gallons which it held at Berber. It still has sufficient volume, however, to pour past Cairo a total current which is estimated, roughly speaking, at 100 billions of tons of water in the year, the largest aggregate of water being in the month of October, when about 20 billion tons flow by Cairo, and the smallest in June, when one billion 500 million tons pass in the month. But perhaps more curious are the figures dealing with the proportions of solids in suspension in the water; these have been very carefully measured and found to give a total of 50 million tons of most fertilising substances in one year, the largest amount being in the month of August, when 23 million tons are carried down to the Delta. In addition to these enormous quantities of fertilising matter, the river has in solution a furthur quantity of 15 million tons. Up to the time of Mehemet Ali the flood water of the Nile passing the banks of the river overlay the whole surface of the Delta for about 100 days, or say during August, September, and October, but Mehemet Ali began a system which has since been continued. It was to confine the main stream, in the season of flood, to its banks, and lead off the water through a vast net-work of canals through the Delta, the water from which would be regulated and let out to irrigate the land, but not to flood it. It has been said that this was a totally new system of watering in the annals of Egypt, but I am not so certain of that, for we read in the Bible, when dealing with the Exodus, these words addressed to the Israelites :—"The land whither thou goest in to possess it is not as the land of Egypt from whence ye came out, where thou sowest the seeds, and watereth with thy foot as a garden of herbs, but the land whither ye go to possess is a land of hills and valleys, and drinketh the water of the rain of Heaven." To-day you may still see throughout the Delta the fellah watering the ground with his foot, opening and closing the mud barrier of the irrigation channel which carries the water from the canal to his fields.

Before I pass from the subject of the annual inundation of the Nile, I would mention that I once met a man who had travelled some 1500 miles along the river before he found out that the inundation was an event of yearly occurrence. He had before imagined, he said, that it took place every two years. "The crane and the swallow observe time," says an Arabic proverb; there are some men, clearly, who would not do either as cranes or swallows.

And now it will be time to turn from the Nile of Egypt to the Nile of the Cataracts.

And first let us briefly describe a cataract. The general stone of the desert is grey sandstone, which in the lapse of ages has yielded to the action of the water, and has become hollowed out into a river channel of more or less depth and regularity. But first at Assuan, then above Halfa, and above that again, recurring at frequent intervals,

ridges of granite crop up through the sandstone desert, crossing the bed of the Nile, and producing a ridge, or series of ridges and rocks, in the channel of the river; these obstacles sometimes extend over miles of continuous water, at other places they are short and abrupt, and immediately above and below them the river is smooth and navigable. But however they may differ as to length and nature, the rock that makes them is always granite, sometimes black, as at the second cataract, sometimes red, as at the first cataract, sometimes of green colour. Worn smooth by the action of the water, the sides of these cataract rocks are polished as a marble chimney-piece, and their teeth-like ridges below the water are dangerous to any craft that touches them. When the Nile is in flood it runs with tremendous force, but comparative smoothness, down these rugged stairways, but, as the waters subside, the rocks begin to show their heads, the angle of descent becomes steeper, and channels of broken water begin to show themselves where, before, the river from shore to shore had been an unbroken volume; then is reached the stage of water, which is easier of ascent to a small boat, but more difficult of descent; for a small boat, propelled by oars or poles, or moved by sails, or dragged by tow ropes, can in these lower stages zig-zag from rock to rock, or eddy to eddy, while the force of the current is not so determined and continuous against her, but in descent it is the other way; when the Nile is in full flood, it has submerged almost all rocks beneath its waves, and the boat, left to the current, is swept along the broad river with great velocity, but with the safety to which the Roman philosopher, already quoted, has borne testimony.

It is at the Second Cataract, immediately south of Wady Halfa, that the real impediments to the navigation of the Nile begin. This cataract is some nine miles in length, having a total descent of about 60 feet in that distance.

It undoubtedly forms the most serious interruption to traffic in the entire distance between Wady Halfa and Dongola. There are ten "gates," or bad bits in its length, and of these the "Bab-el-Kebir" is a very formidable obstacle.

Twenty six miles further south is the cataract of Semmeh, the old frontier of Egypt in the reign of Thothmes. A very striking scene it is.

The mountains closely approach the bank on either side, and on the summit of each overhanging cliff stands a ruined temple. Beneath these bordering rocks the river pours its volume, here pent to narrow limits between a great barrier of rock midway in the channel and the eastern and western shores.

From the summit of the ruin-crowned cliff on the east shore the eye ranges far over the wilderness of the Batn el Hagr—"The Womb of Rocks"—a region which for 60 miles presents on every side the extreme aspect of desert desolation.

In these 60 miles occur the large cataracts of Ambigol, Tangoor, and Dal, besides many smaller rapids, or "shillals," as the Arabs call them, places where the river makes a noise. Once the cataract of Dal is

passed there is no serious obstacle until Kaiber is reached, and that crossed, there remains only the bad water of Shaban, and the so-called Third Cataract, to be overcome, until the open river, 40 miles below Dongola is reached. This Third Cataract is, in reality, the seventh of importance counting from Wady Halfa. I have gone up and down it many times, and can safely say that as an obstacle to navigation it is not of greater magnitude than at least three of those which intervene between it and the Second Cataract at Wady Halfa. The progress of the railway, however, to Abu Fatmeh, at the head of the so-called Third Cataract, will obviate all necessity for using the river between Wady Halfa and Dongola, and will enable men and stores to be conveyed in two days over a track of country which took an average of about twenty days to accomplish in the expedition of 1884.

Arrived at Abu Fatmeh, we begin an unbroken stretch of navigation which extends through the entire province of Dongola, and into the province of Shagghiea for fully 220 miles.

And here at Abu Fatmeh it will be well to devote a few words to the people and products of the land we have now reached, the province of Dongola.

The Dongolavi, or Dangala are of a race distinct from the people of Egypt, the old Nubian race, dark skinned, and straight haired, the true Ethiopian, whose family is still to be found in all its pristine vigour, and warlike prowess, amid the mountains of Abyssinia. This race in its Nubian representation, has undergone a sad deterioration since its conquest by the Arabs, some 400 years ago. Indeed, it may be said that the riverain population along the whole course of the Nile from Wady Halfa to Berber are marked by the same dishonest, unstable, cruel characteristics. This Nile has for hundreds of years been the high road of slavery, the Dongolavi has been the middleman, the "gillab," the slave trader; first Christian, the mixed Moslem and Christian, then wholly Moslem, he has always been a trafficker in human flesh, a drunkard, and a liar. In addition to these traits, successive waves of conquest and years of subjection have now made him an arrant coward. As to the products of the land, they are those of Egypt, but of very limited quantities; the Nile only inundates a narrow patch of level land, sometimes on one side of the river, sometimes on the other, rarely upon both sides at the same time. Undoubtedly, in the old days the cultivated extent was much wider than it is at present, and undoubtedly, too, the population must, at some period not more remote than 400 years, have been immensely in excess of its existing number. Dongola is to-day a land of ruin and sand-drift, there is no country in the world in which the tax collector can pursue his calling with so much ease as in Dongola; a boat on the river and a few Bashi Bazook tax-gatherers on either bank enable these narrow shreds of cultivation to be quickly gleaned of food or money. I have seen a Bashi Bazook tax-collector of the former Mudir of Dongola coolly firing his loaded rifle into a village at the opposite side of the river simply to hasten the inhabitants at their work of bringing the ferry boat across to him. It was also not an uncommon custom of

these guardians of public order to raid a village, carry off all the women, and then sell them back to their male relations again. There has been a good deal of excitement over the manner in which the Turkish government in Armenia has carried on its authority during the last few years, but I doubt if it has very much differed in any portion of its dominions, or to any particular tribe of people within them, and there is this to be said, that the idea of government, or authority, or taxation, call it what you will, is pretty much alike in the east. When the order for the withdrawal of the English army of the Nile Expedition reached Dongola in May, 1885, I received at the advanced post at Merawe, 200 miles beyond Dongola, in the country of the Shagghiea Arabs, a telegram from the Chief of the Staff directing me to confer upon a certain Mohammed Wad Ganaish, the position of governor of the district. This man had been known, with so many others, to be exceedingly doubtful in his allegiance to the Egyptian government, but he was of the race of the old Maleks, or kings of the Shagghiea, in that part of the country, and it was deemed better to make some attempt at establishing rulership, than to abandon the land to the complete confusion of there being "no king in Israel." I sent a message to Wad Ganaish and received an answer that he was ill of fever, and would come when able to travel. In a day or two he arrived, with a dozen or so followers, all mounted on excellent trotting camels; the conference began, Ganaish being supported by an attendant as he was still suffering from fever. I briefly explained the wishes of the Government in relation to him; he was to rule the country as Hakeem, a grade in Eastern life below that of Malek, and above that of Sheikh. When I had finished he spoke his mind. "Government was a great and good thing," he said. "He would undertake the work of ruling the country of Merawi according to custom. By right of birth and parentage it was his place to do so, for his father had cut off heads, his grandfather had cut off heads, it had always been the peculiar privilege of his ancestors to cut off heads, and he, Wad Ganaish, was fully prepared to go on cutting off heads." That was all; we marched next morning from Merawi.

I am not at all sure that if we were to settle permanently in these parts we would not, sooner or later, approximate in our ideas of life to the people who dwell there. The man who, of all men, best knew the races of the east, was of the same opinion. "Residence in these Oriental lands," wrote Charles Gordon, "tends, after a time, to blunt one's sensibilities of right and justice, and therefore the necessity of men to return after a time to their own lands to reimbibe the old ideas again. The varnish of civilised life is very thin and superficial—man does not know what he is capable of in circumstances of this sort."

Quite sure am I that we should change our natures sooner than the Arabs or Sudanese would change theirs. And I will tell you why I think so. At Korti, in 1884, I was given an interpreter, one Gemaul Ghendi by name. His history was a curious one. Twenty or more years earlier he had been taken by an English lady travelling on the Nile from his native village near Korosko. He was then six years of

age; his brother, a year older, had just been devoured by a crocodile, and his mother, by no means averse to a further reduction in her family, had very willingly consented to give him to this rich English lady, for a consideration; so the imp was taken and brought to England, where he was put to school, educated with all care, and finally blossomed out into a page boy to the lady who had taken pity on him. When he grew older he became valet to his master, was taken to travel through Europe, and rapidly learnt French, German, Italian. He was regarded as a marvel of civilisation. Here at last was an Ethiopian who had changed, if not his skin, certainly his habits. He was presented to the Emperor of Austria, the Pope had spoken to him, everybody said he was a first-class linguist; he understood all the duties of a personal attendant; to say that he rode well, and shot accurately, was only to say that he was a Barabera. Well, when this man joined me, I, too, was delighted with him, he was everything at once. He waited, made one's bed, rode always near, and was a first rate shot—no small advantage where cartridges were very scarce—and would stalk a lot of doves on a tree, until, getting half-a-dozen in a line, he could secure, with a single cartridge, a change of course for dinner from the eternal tinned beef of America, even sufficient for four persons.

One day, astonished alike at the versatility of his genius and the record of his triumphant career through half the capitals of Europe, and before so many of the crowned heads, I asked him how it happened that he had come back to the Soudan again in the capacity of interpreter. He replied that he had come for the sake of the sport which he understood was to be had with large game on the Nile, that he had left a wife in Vienna who was connected with a circus and travelling menagerie business, and that he hoped to return to Austria when the war was over. Indeed among capitals, Vienna seemed always to be his favourite, and speaking of sport, he invariably expressed a preference for grouse driving.

When the expedition returned to Wady Halfa I took a short leave of absence to England before assuming the command at that station; but before starting from Halfa, I confided my horse, camel, and donkey to the care of Gemaul Ghendi who had also charge of an escaped slave who had joined us *en route* from Merawi, and about whom Gemaul had professed philanthrophic views, which, had he delivered them before an English audience, must have proved highly remunerative.

In two months I was back again at Wady Halfa. Gemaul Ghendi was nowhere to be found, neither were my horse or donkey; the camel was discovered in an emaciated condition in the transport lines, the escaped slave had disappeared. After a while a native turned up who volunteered the information that he knew of the whereabouts of Gemaul. He had not gone to Vienna, he was at a village about 100 miles lower down the river near Korosko. I wrote to this village, but could obtain no answer. Then I communicated with the commandant of Korosko, asking him to send a patrol of police to the village indicated, there to arrest one Gemaul Ghendi, an interpreter. A week later, the escort arrived at Wady Halfa with their prisoner,

but what a prisoner they had brought. Not my well-known interpreter, guide, and philosopher in neat European dress, but a mean-looking native in blue gallabeah and large white turban, with shaven face and shuffling gait. What a stupid mistake they had made. But, as I looked longer and closer, it dawned upon me that this Nubian native was no other than my late sportsman, my intelligent traveller, my excellent valet, my incomparable Ghendi. It was even so, and then the rude awakening that came to me! He had gone back at one fell swoop to his original village, flung off his neat suit of European clothing, put on all the outward marks and tokens of Ethiopic Mohammedism, sold my large Egyptian donkey, treated the escaped slave in the same fashion, and was now the proprietor of a small sakeeyah and a large harem in the same spot from which he had been taken as an infant five-and-twenty years before.

There is a proverb in the Soudan which says that "Arab's blood and Turk's blood will never boil together." Still less, I think, will the east and west amalgamate their ideas or their civilization. The ramparts of race are not to be thrown down by the whistle of the steam engine, but it is just possible that the engine may burst her boiler in attempting the operation.

Meanwhile we have some distance to travel in our paper, and we must proceed with our Nile notes.

In its course through the province of Dongola the Nile begins or ends, as we take the stream up or down, its great bend at Debbeh.

From Debbeh to Khartoum by desert is 220 miles, but by river it is 570 miles. The yellow sands again border the stream for a considerable distance, and palm trees, except at rare intervals, have disappeared. The islands, however, and they are numerous, are always rich in cultivation. This bend of the river marked the old boundaries between the Dongolavi or Nubians, and the Shagghiea Arabs, one of the most celebrated tribes on the Nile, before the era of the Turkish conquest, and before we pass on our way we may say a few words about them.

The Shagghiea speak only Arabic, and they speak it well, while their neighbours, the people of Dongola, speak Nubian and Arabic, the latter indifferently. The Shagghiea are undoubtedly of pure Arab blood; they have been settled on this portion of the Nile for ages, and were probably some of the earliest Arabs who, penetrating from the Red Sea, entered the kingdom of Nubia above the cataracts. But their warlike days ceased when the son of Mahemet Ali conquered the the country in 1120. It is curious to compare the account of that campaign with our own experience of the manner in which the tribes fought at Souakim and on the Nile. The same headlong rush of spearmen, the same disdain of fire-arm and wound, the same necessity for square formation; one change, however, the 60 or 70 years had brought about. In 1820 the Dongola horse was to be found in large numbers along this part of the Nile; he is now a rare animal. The Turk soon found that the mounted Shagghiea was too nimble a foe for

their lazy methods, so they proceeded to destroy the horse wherever they found him.

The breed of horses called Dongola is a distinct one and of extraordinary hardiness. They are of larger size than the Syrian Arab in use in Egypt, they have white faces and, nearly always, four white stockings, but the best have three; the mouth is hard, almost as the bit in it, the roughest ground seems able to offer no impediment to their speed, and a Shagghiea Arab is as thoroughly at home on their backs as any rider in the world. One feat these Shagghiea were in the habit of performing with their horses, which was almost peculiar to them, they were accustomed to swim these hardy little horses across the broadest part of the Nile by day or night in any stage of water. It was this power that made them such formidable raiders in the ages preceding the Turkish conquest, and the islands in mid channel, with three-quarters of a mile of water running swiftly on either side, were almost as liable to ravages at their hands as were the villages on the mainland.

As we approach the upper end of the two hundred miles of good water between the two great series of cataracts, a remarkable steep sided and flat-topped hill becomes visible on the proper right bank of the Nile. This is Gibil il Barkal of the Arabs. At its foot, and between it and the river, the ground is encumbered with immense ruins, prostrate columns, the debris of great temples, sphinxes, &c. On the ridge of the desert, behind the hill, are many pyramids still in excellent preservation; the entire scene is a very striking one—here, 1500 miles from the Mediterranean, the evidences of a remote civilisation are everywhere to be seen.

This place was, in fact, the chief centre of Ethiopian power in the earliest recorded ages. Here stood the city of Nepata, the residence of Queen Candace, and probably of the Queen of Sheba. There is still a village on the river bank close by that bears the name of Shibbeh. In the days of the Shagghiea it was the residence of the magicians of the tribe, whose amulets were supposed to protect the wearer from bullets in battle; but, after the action near Korti, where so many of the Shagghiea fell under the fire of the Turkish guns, the first act of the retreating Arabs was to kill all their magicians.

Ten miles above Gibil Barkal begins once more the troubled water of cataracts, a series of ripples in every respect more formidable than that which lies between Wady Halfa and Dongola.

For 150 miles above this point the Nile still keeps the great bend to the north which it began at Debbeh, but throughout the greater portion of that distance it is a river rent by rocks, foaming through many channels, seldom held by a single stream between its banks, but filled with large rocky islands which sometimes overlap each other in mid-channel, so that between the proper east shore and west there will frequently be three or four islands lying, one behind the other, many of them being from five to ten miles in length, and all filled with precipitous rocks and rugged hills of considerable elevation. Winding amid these rugged islands the river pours its flood through channels

as filled with enormous rocks, as the shores and islands are themselves encumbered with the same granite masses. No wilder scene can be imagined than this waste called Dar Monassir. For miles together there is no vestige of vegitation : silence is broken only by the noise of the foaming waters; the rocks left bare by the subsiding current, and black and polished by sand and sun; wherever it is possible to climb the rugged hills on either shore, the eye ranges only over a wilder area of desolation, burnt and cindery rocks rise up in every direction from amid wastes of sand. At times the channels of the river are so sunken beneath the level of the granite wilderness around that they are perfectly hidden from sight at only a short distance from the shore. At intervals the islands disappear, the river flows gently in a single stream between shores of black granite, as though its waters were resting between the cataract at Owli to the island of Sherri, a distance of about sixty miles, there cannot be less than twenty-five cataracts. Up to a recent period, in fact up to the boat expedition of 1884, little or nothing was known about these cataracts of Monassir. This was owing to the fact that they had always been avoided by travellers passing between Egypt and the Soudan; the caravans invariably quitting the Nile at Korti, and striking it again across the Bayouda at Metemmeh or Berber.

But that they were passable at the height of inundation was proved by the fact that in the late sixties, or early seventies, two steamers had been taken up at high Nile from Dongola to Khartoum. It was this fact which was doubtless in Gordon's mind when, in his journal at Khartoum, he wrote :—"That there was only one small cataract to pass between Abu Hamed and Merowe, which is by all accounts an easy one."

As a matter of fact that very portion of the river is the most obstructed by cataracts of any in its entire length; but perhaps misconceptions regarding its true nature are the most conclusive proof that it was an unknown region. In looking for, or thinking of, the source of the great river, the explorer and the map-maker had alike forgotten the central portion of the stream where it pours its spent waters down the winding stairways of Dan Monassir.

Passing the cataracts of Owli, Kab el Abd, Umahboa, Rahami, Uss, Shoar, and Sharrari, we emerge at last into quieter water, where the Nile, once more held in a single channel, and having sand instead of granite rock on its shores, flows past a small group of palms, and half-a-dozen mud huts called Hebeh. There is a small island, El Kun, opposite the group of huts, divided from the right bank of the river by a channel which is dry at low Nile. All around spreads a desert of yellow sand and gray rock, through which conical hills, whiter than the prevailing colour of the plains, abruptly show themselves.

It was between the little island of El Kun and the right bank of the river that the steamer "Abbas," sent by General Gordon in September, 1884, with such precious freight of man and manuscript, was wrecked; and it was in the wretched group of mud huts on the shore that Colonel Stewart, the French and English Consuls, and their

servants were treacherously cut to pieces by the Monassir Arabs.

We are here at Hebeh more than 1000 feet above the level of the sea. The desert is still all drift and desolation, yet, that at some period it must have been otherwise, is shown by the massive ruins of old castles found at intervals along the shores; two, in particular, built at El Kab at each side of the river, of immense strength.

The regular courses of masonry, the burnt bricks of best workmanship built into the well designed walls, the stairways to towers and flanking defences, all told of some period of civilisation and organised community, very different from the nomad tribes that now roamed this world of drift-sand.

Thirty miles above El Kab, the Nile turns off once more to the north at Abu Hamed; at this turn is the second largest island in the river's length, the island of Mograt, more than 20 miles long. The western extremity of Mograt was the extreme point reached by the advanced-guard of the river column on the 24th February, 1885, the day upon which the order to retire over the cataracts reached the column.

On that day 215 boats were assembled at Huella at the end of the Monassir country, carrying 3000 soldiers. All the worst troubles seemed to be past, exactly that day month 217 boats had left the foot of the Fourth Cataract at Owli, 215 had gained the head of the hitherto impassable cataracts of Dar Monassir, and there were still nearly 60 days' food in the boats for the entire force.

From Abu Hamed to Berber is 130 miles. In that distance there occur two cataracts, that of "El Baggada," or the "Cows," at 50 miles, and again the "Shellal el Umar," or "rapid of the wild asses," at 80 miles distance. Then comes the town of Berber, from whence it is 200 miles to Khartoum, with a single rapid, that of the Shablouka, intervening.

This cataract of the Shablouka is sometimes for some unexplained reason called the Sixth Cataract, whereas in reality it is the nineteenth.

And now, at the top of the cataracts it is time to say a word about the life, other than human, which is to be met along the arid waste we have traversed.

Limited though it be, it still bears the stamp of the river which has given it life. The camel, the oldest of all beasts of burden, greatest helper of man in the wilderness, is, of animals, the one most frequently in sight on the shores. In spite of all that has been said and written about him, it is doubtful if justice has ever been done to him. To the western he is uncouth, rough, illnatured, repellent, ugly, even the Arab, in his tradition of the creation of animals, declares, with reference to the first camel, that "The Lord Himself was greatly surprised at the creature he had made." But that is only of outward shape and form. No other beast known to man is so useful to him, food, raiment, transport, these he gives, and if he gives them grudgingly we must remember that he is the oldest slave on earth, and that his very deformities of structure are supposed, by the best naturalists, to have been the slowly gathered inheritances of the immense time during which he has been the slave of man.

"There is a look about a camel," wrote an English officer from the Soudan, "which always gives me the idea that he is going a long way off." It is true, and he has come a long way too. How many millions of desert miles has the camel travelled since that far off day when we read that Isaac "lifted up his eyes and saw camels coming afar off?"

All these ages of toil and thirst seem to have concentrated their essence in this strange beast; why should he be anything but sulky, and stubborn, and impatient? His very food is made up of things that bristle with spikes and thorns. "When I attempted to pat him after he had brought me safely through the desert in July," writes the officer already quoted, "he turned towards me with a savage growl. He had done his work, he needed no thanks."

Another remnant of old world life which the Nile still preserves, but one differing in every respect from the camel, is the crocodile. He is numerous at all the cataracts from Dal upwards, but especially on all the sand banks in the Shagghiea country; but because he is not now seen in reaches of the river below the Second Cataract, it is not to be supposed that he has altogether abandoned these waters. During the hot season of 1885, when I was living in a Dahabiha at Wady Halfa, a rumour went about among the natives that there was a very large crocodile in the river at that place. My boat had been there for months, and as the water shrunk daily into smaller volume, and there was no appearance of the monster, I thought it was impossible he could be there, but one very hot evening when I was sitting at the stern of the boat, all at once the head of an enormous crocodile was thrust above the surface a few yards distant.

During the inundation, and through the winter months, the natives seem to take little heed of the presence of the reptile; but in the hot season before the river rises, their methods are quite different; you will then see the women at all the villages in Dar Shagghiea throwing stones and lumps of dry mud into the water to drive away the crocodiles from the proximity of the bank while their companions are filling their pitchers in the shallow margins.

The natives assert that the crocodile swallows large quantities of round stones at one season of the year for the purpose of keeping himself on the bottom of the river; certain is it that there is a period of the year when he seldom shows above the surface, and I can myself vouch for the fact that the stomach of a large crocodile, killed at Merawe in 1885, was found to contain a bushelful or more of round stones, many of them as large as eggs, quite smooth and polished.

Of fishes, the river possesses a vast number and variety, some of great size. The largest are only occasionally taken when the river is falling rapidly. Sometimes at this period a monster fish will find himself caught in shallow water, or held inside a ledge of rocks which prevents his getting into the deeper river. At Abu Fatmeh, in November, 1884, my crew of West African Krooboys secured a very large specimen of the Samous, a Nile salmon, among some rocks where they were bathing; the fish weighed 115 pounds, and was as perfect

in shape as the best salmon could be; he was disabled in the shallow water by repeated blows of an axe.

Everybody knows that Khartoum stands at the point of junction of the Blue and White Niles. It was founded and made the seat of government and the centre of trade by Mehemet Ali.

Its government was Turkish, its trade was in slaves and ivory, two ivories in fact, for one was the complement of the other, and the "black ivory," as slaves were named, was the transport used to carry to the Nile shore, from the forest swamps of the interior, the ivory of commerce which the wild elephant supplied.

But these are questions which lie outside the limits of this paper, and were I even to follow the great river along those lower shores we have been travelling, into these ramifications of its upper water, and the races of men who dwell upon them, your patience would scarcely go with me on the journey, besides, it is possible that in dealing with the relations between the governing powers in the east and their subjects, we might enter into ground forbidden to this Institution.

Whenever I hear or read the numerous declarations of those persons in western lands who are desirous of improving and benefiting the condition of the Mahommedan peoples of the east, I am reminded of a story of a traveller on the Nile, who, in his attempts one day to shoot a quail, had the misfortune to lodge a portion of the charge of the shot in the body of a native who was reposing on the shore. Horrified at the accident, and being desirous of making compensation to the native for the injury he had received, the sportsman wrote immediately to the Mudir at the nearest government post reporting the occurence, and begging that action might be taken in the matter. On his return journey down stream the traveller called upon the Mudir to enquire how far his wishes to ameliorate the condition of the wounded man had been carried into effect. He was assured that everything had been done, that his wishes had received the fullest attention.

And how much did your Excellency give the wounded man? asked the traveller, desirous of reimbursing the Governor for the expenditure incurred.

"Fifty strokes of the kourbash," solemnly replied the Mudir, "and he will receive another fifty to-morrow, Bismillah. I do not think he will never be wicked enough to get in the way of your Sublimity's gun again."

There was no discussion; the Chairman's remarks in returning thanks for the lecture were received with much applause.

AN EPISODE

IN THE

SIEGE OF SEBASTOPOL.

THE CONTEST BETWEEN THE LEFT ATTACK ADVANCED BATTERIES AND THE RUSSIAN BATTERIES, ON THE 13th & 14th OF APRIL, 1855.

BY

COLONEL F. A. WHINYATES, LATE R.H.A.

THE stirring events of the Crimean war, more than forty years ago, have been lately recalled to our minds by several recent publications.* It would therefore not seem inopportune to draw attention to a remarkable incident which occurred in the siege batteries before Sebastopol during the second bombardment in April, 1855, which reflects distinction not only on the Royal Artillery immediately concerned, but also on their Regiment. There need therefore be no apology for publishing the particulars of the incident referred to in the Proceedings of the R.A. Institution. Before however giving the details, it will be as well briefly to relate what had happened in the siege operations previous to the opening of the second bombardment.

After the battle of Alma, and the flank march by which the Allies placed themselves before the south side of Sebastopol, it was decided, before attempting to assault the place, to land the siege train and to bombard the Russian defensive works. The necessary preparations were all completed by October 17th, and on that morning the siege batteries of the Allies opened fire.

* "The Highland Brigade in the Crimea," by Sir Anthony Sterling, K.C.B.; "Letters from the Crimea," by Colonel Colin Campbell, 46th Regt.; "The Crimea in 1854 and 1894," by General Sir Evelyn Wood, V.C., G.C.B.; "Letters and Diary, Crimea and India," by Sir Charles A. Windham, K.C.B.

From the first, the fire from the French batteries was observed to be less vigorous than that from the English, and about 9 a.m. a magazine was unfortunately blown up by a Russian mortar shell in their works opposite to the Flagstaff Bastion, followed two or three hours later by another in the same locality, and from a similar cause. The wreck and loss of life from these explosions were so serious that the French seemed completely discouraged, and hardly fired a shot afterwards. On the other hand, although under a heavy cannonade, intensified when the French batteries became silent, matters were very different with the English, the superiority of whose fire over the batteries opposed to them was soon apparent. The Malakoff tower and its works were silenced; many guns in the Redan were put out of action; and at 2 p.m., a magazine exploded, blowing out the right face of that work with immense damage, silencing the remaining effective guns, and carrying consternation among the troops drawn up in rear of the Russian works ready to meet an assault. There can be little doubt that had the French performed their part on this day as effectively as the English, an attack that evening would have enabled the Allies to make lodgments in the principal Russian works, and that the fall of the south side of Sebastopol would probably soon have taken place. So great, however, was the collapse of the French siege works, that they were not even next morning in a position to resume the bombardment, by which time the enemy had repaired and rearmed theirs, and although the English batteries on this day again overpowered the Malakoff and the Redan, yet the inability of the French to subdue the fire of the Flagstaff Bastion, rendered the project of an assault out of the question, and it was therefore decided to extend and advance the siege works, and prepare for a renewal of the bombardment with greater resources.

We may pass over the attacks made by the Russians at the battles of Balaclava and Inkerman, the hardships and sufferings endured by the armies during the inclement winter of 1854, and the difficulties experienced, owing to defective transport and a road-less country, in bringing guns, mortars, ammunition, stores, provisions and forage from Balaclava to the front, all of which retarded the work in the trenches, and the arming of the new batteries. In consequence of these drawbacks, it was not until April that the Allies were in readiness to renew the bombardment. Since that in October, at the furthest point of the Left Attack, on the edge of the ravine, called by us the Valley of the Shadow of Death, there had been added two new batteries, contiguous one to another, and numbered 7 and 8. But the state of the ground, owing to continuous rain, had prevented their being armed by the date upon which it was decided to again open fire on the fortress.

It may be mentioned here, that in arming the batteries, the guns on sling carts, sling waggons, or platform waggons, were brought by the Horse or Field Artillery to the rear of the first parallel, where they were met by strong fatigue parties, who, by means of drag ropes and man harness, hauled them to their respective positions. The work, owing to the nature of the approaches, was very arduous, and frequently from the enemy's fire, very hazardous. The guns used by the Royal Artillery were, for the most part, mounted on travelling carriages. For manning the different calibres, the number of men was as follows :—

68 pr., 95 cwt.
10-inch guns
8-inch guns
Lancaster guns
} 8 to 9 men each.

32-pr. guns
24-pr. guns
} 6 men each.

13-inch mortars, 7 men each.
10-inch mortars, 6 men each.
8 and 5½-inch mortars, 4 men each.

Besides these, there were magazine men to look to the ammunition, load shells, cut and fix fuses, etc. During the several bombardments, the hours for the reliefs varied ; in that of April, they were at 1 a.m. and 3 p.m. daily.

As there were batteries both in the Right and Left Attack, served by the Royal Navy, it will be interesting to compare their arrangements with those of the Royal Artillery. Their guns were on ship carriages and worked as if afloat. The number of men for each description of ordnance in a gun's crew was as follows :—

68-pr., 95 cwt. 1 Petty Officer and 36 men each.
Lancaster guns, 95 cwt. 1 Petty Officer and 36 men each.
10-inch guns. 2 Petty Officers and 32 men each.
32-pr. and all other guns. 28 men each.

These guns crews were divided into four reliefs, Nos. 1, 2, 3 and 4. In the winter time, only one relief went into the batteries day or night. During a bombardment, two reliefs were always present in the daytime, but only one through the night.

Commencing the 1st of April, 1855, the reliefs were regulated as follows :—

First day : Nos. 1 and 2 reliefs went into the batteries at daylight, 1st relief returned at sunset, leaving 2nd relief in the batteries for night duty.

Second day : 3rd and 4th reliefs went in at daylight, 3rd returned at sunset, and 4th remained for night duty.

Third day : 1st and 2nd reliefs went in at daylight, 2nd returned at sunset, and 1st remained for night duty, and so on.

Each relief had thus thirty-six hours in the batteries every four days ; the night reliefs were always allowed twelve hours rest, after which they were told off into the necessary working parties for carrying powder and shot, or other fatigue duties connected with the batteries. On the other hand, the men of the Royal Artillery were nominally relieved once in twenty four hours, but counting the time taken in marching to and fro between the trenches and the camp, about one-and-a-half hours, those in the Left Attack had but ten hours off duty out of the twenty four, while in the Right Attack, they had ten hours on duty and only six off out of each sixteen hours.* The armament of our batteries in the Left Attack is given in the morning states, Nos. 1 and 2, which are appended.

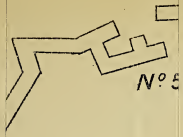
Having thus given details of our batteries and the arrangements connected with them, the subsequent account of the bombardment will be more intelligible if we add some particulars concerning the Russian batteries with which they had to contend. For simplicity's sake, the information is tabulated. On one side is given the ordnance in, and the nomenclature of the Russian batteries, and on the other, the names by which we called their batteries. Looking then towards Sebastopol and beginning on our right with the Redan.

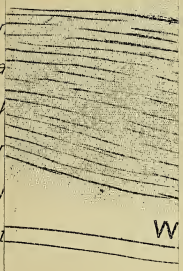
* For these details, see "Artillery Operations by Royal Artillery and Naval Brigade before Sebastopol, 1854-5," by W. E. M. Reilly, C.B., Captain and Brevet Major—Brigade Major Siege Train. Kane's List, No. 2081.

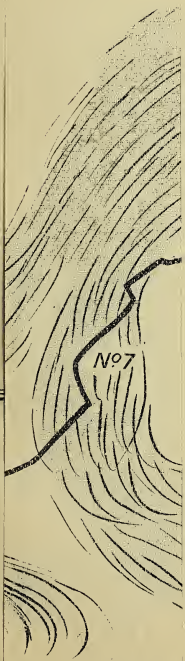
TABLE showing the Russian batteries opposed to the Left Attack in April, 1855, taken from "*Etat de l'Armement du Côté Sud au* $\frac{28\ Mars,}{9\ Avril,}$ 1855," Vol. 2, Part I., pages 387 et seq., Todleben :—

ENGLISH NAME.	RUSSIAN NAME.
The Redan. (Sketch I.)	Bastion No. 3. face ... ... 10 guns
Flank of Redan and considered part of that work by us. (Sketch I.)	Battery No. 27 (Artukhow) { 4 guns 1 mortar
Batteries connecting the Redan with the Barrack Battery, probably called by either name by us. (Sketch I.)	*Au droite du Bastion No.* 3. Battery No. 23 (Smaghine) ... 16 guns „ „ 39 (Zoubow) ... 3 „ „ „ 52 (Wolynsky) ... 3 „
Called either Redan or Barrack Batteries by us. (Sketch I.) These batteries, Nos. 45, 46, 47, were not constructed when the sketch was made, in December, '54, or January, '55.	Detached batteries on edge of the ravine in front of No. 23 Battery. Battery No. 45 (Potemkine) ... 4 guns „ „ 46 (Chweikowsky) 2 „ „ „ 47 (Popandopulo) 2 „
The Barrack Battery. (Sketches I. and II.)	Battery No. 5 (Nikonow) ... { 36 guns 3 mortars
The Creek Batteries. They did not much interfere with our batteries. They were placed to meet an attack upon the fortress up the bed of the ravine. (Sketch III.)	*Batteries sur le Perresip.* No. 15 (Père Komsky) ... { 11 guns 2 mortars „ 81 (Stahl) ... ... 21 guns „ 16 (Kriakine) ... ... { 9 guns 2 mortars
Garden and Garden Wall or Town Batteries. (Sketch III.)	*Batteries du Boulevard.* No. 31... ... ... 2 guns „ 32 .. .. { 2 guns 3 mortars „ 33... ... ... 2 guns „ 34... .. .. 2 guns
Between Boulevard Batteries and the Flagstaff Bastion. Probably considered by us part of the Garden Batteries. (Sketch III.)	Battery No. 75 (Lwov) ... 10 guns
On slope of the hill in front of the proper left face of Flagstaff Bastion. Probably called Flagstaff by us.	Battery No. 38 (Kostomarow)... guns
Flagstaff Bastion. Proper left face bore on the Left Attack, but this bastion had principally to do with the French attack in its front. (Sketch II.)	Bastion No. 4.—Proper left face, 10 guns. There were a number of guns for interior defences, and also 6 mortars of various sizes.
On the same level and in rear of Flagstaff Bastion. These batteries fired at us over lower part of Garden Batteries. (Sketches II. and III.)	Battery No. 51 (Lipnine) ... ... 4 guns „ „ 80 (Paul) ... ... 4 guns

The plan, sketches and list give a clear idea of the Russian batteries. Sketch I. is taken (by permission) from a series made in the early part







THE LEFT AT

OPOL.

Redan (Bastion N°3)	about	760	Yards.
Barracks Battery	"	600	"
Creek	"	650	"
Lower Garden Batteries	"	650	"
Upper Garden	"	760	"
Flagstaff (Bastion N°4)	"	900	"

Distant from the Advanced Batteries Nos 7 & 8

Nº 80

Nº 51.

Nº 5.

Nº 39.

Nº 23.

Nº 52.

Nº 47.

Nº 45.

Nº 27.

BASTION Nº 3.

Nº 46

Nº 81 STAHL

Nº 15

WARONZOF RAVINE

Nº 16.

Nº 31.

Nº 32.

Nº 33.

Nº 75

Nº 34.

BASTION Nº 4.

Nº 38.

PICKET HOUSE RAVINE

SMALL GRAVEYARD

Nº 8.

Nº 7

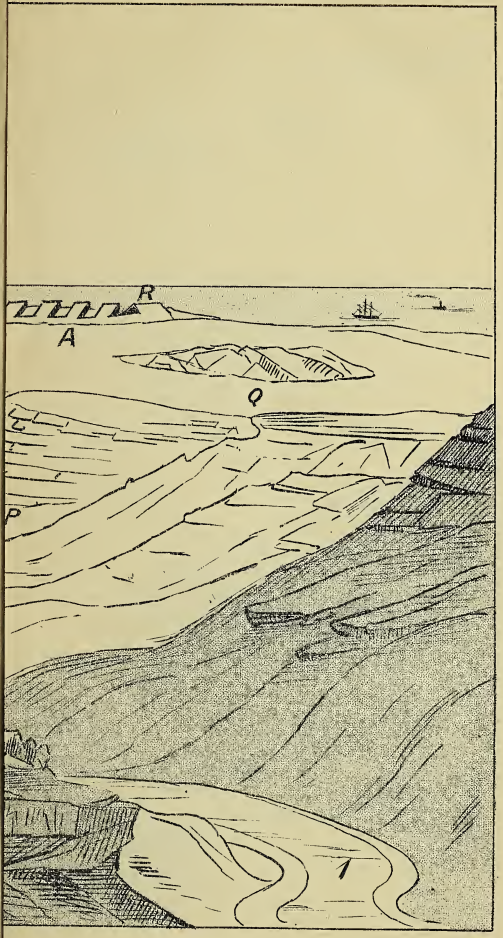
3rd PARALLEL

VALLEY OF THE SHADOW OF DEATH

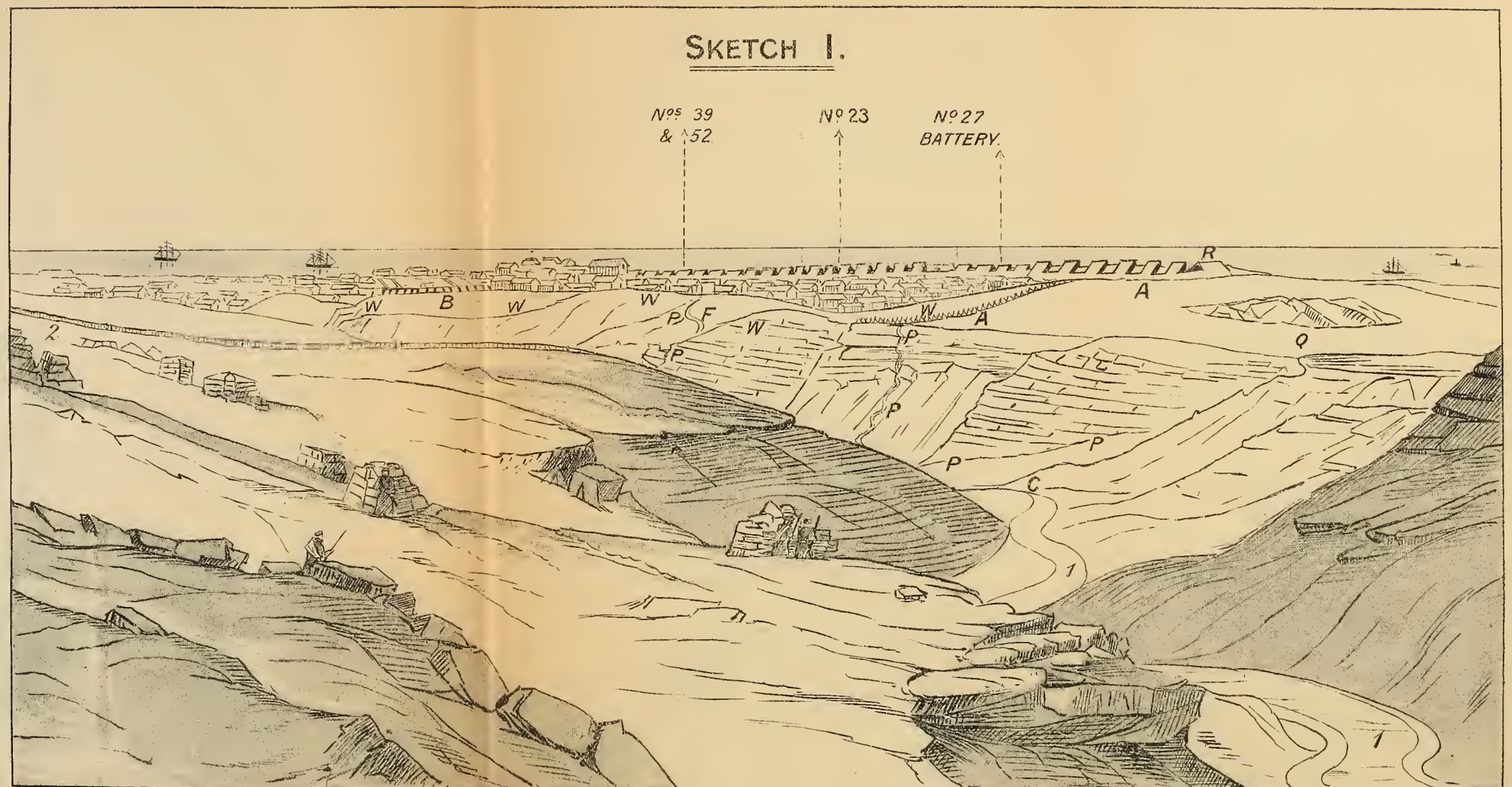
Scale of Metres 1/4200

Metres 50 25 0 100 200 300 400

PLAN SHEWING THE RUSSIAN BATTERIES OPPOSED TO THE LEFT ATTACK,
FROM
TODLEBEN'S PLAN GÉNÉRAL DE SÉBASTOPOL.


R
A
Q
P
1

SKETCH I.

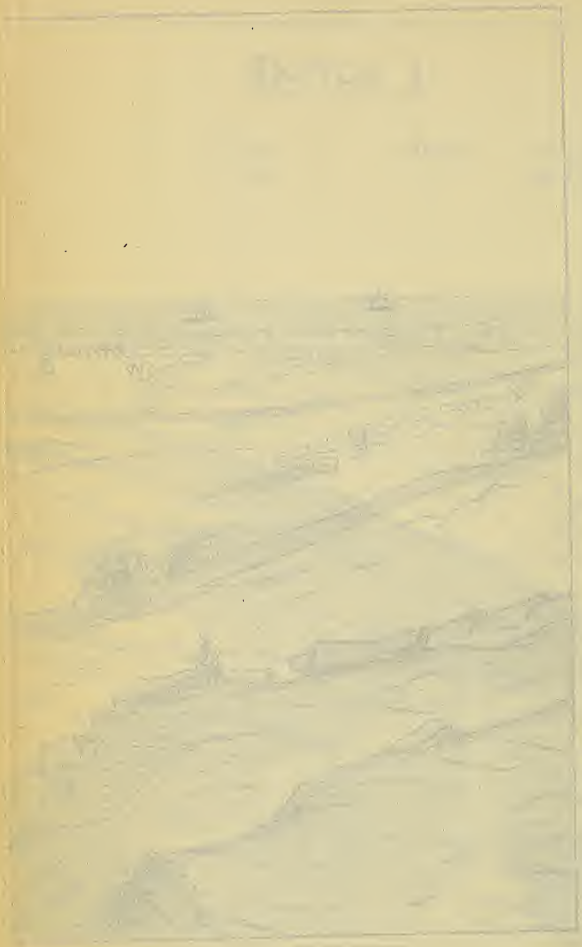


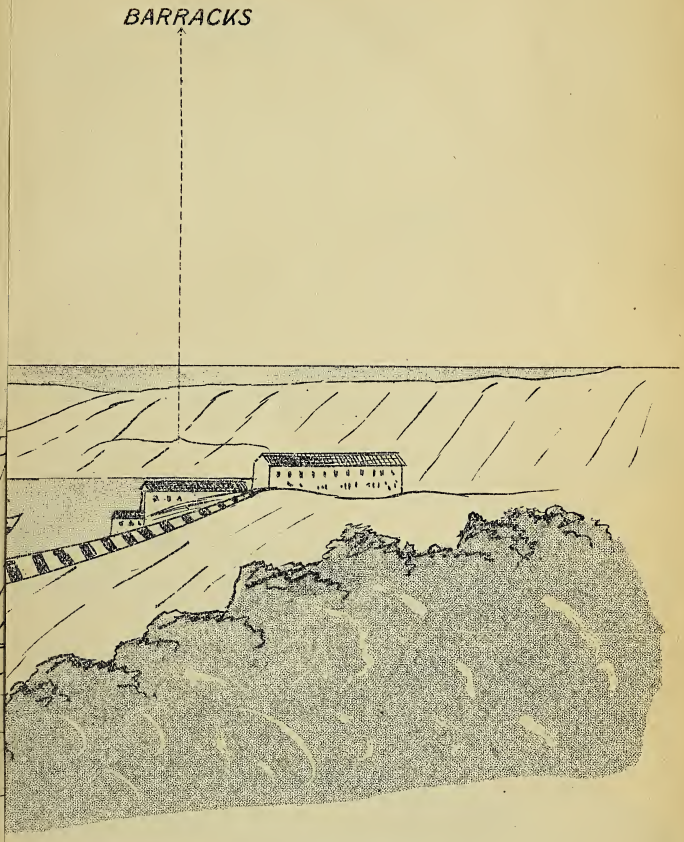
Q. Quarries.
R. Redan.
A. Abattis.
W. Wall in front of Dockyard Labourers' Cottages.
P. Paths.

F. 2 Field Guns.
B. Barrack Battery.
2. Second Parallel, Left Attack.
1. Woronzoff Road.
C. Cut across Road.

Looking down the Ravine between the Right & Left Attacks.

This Sketch was made during the Winter of 1854 - 5.

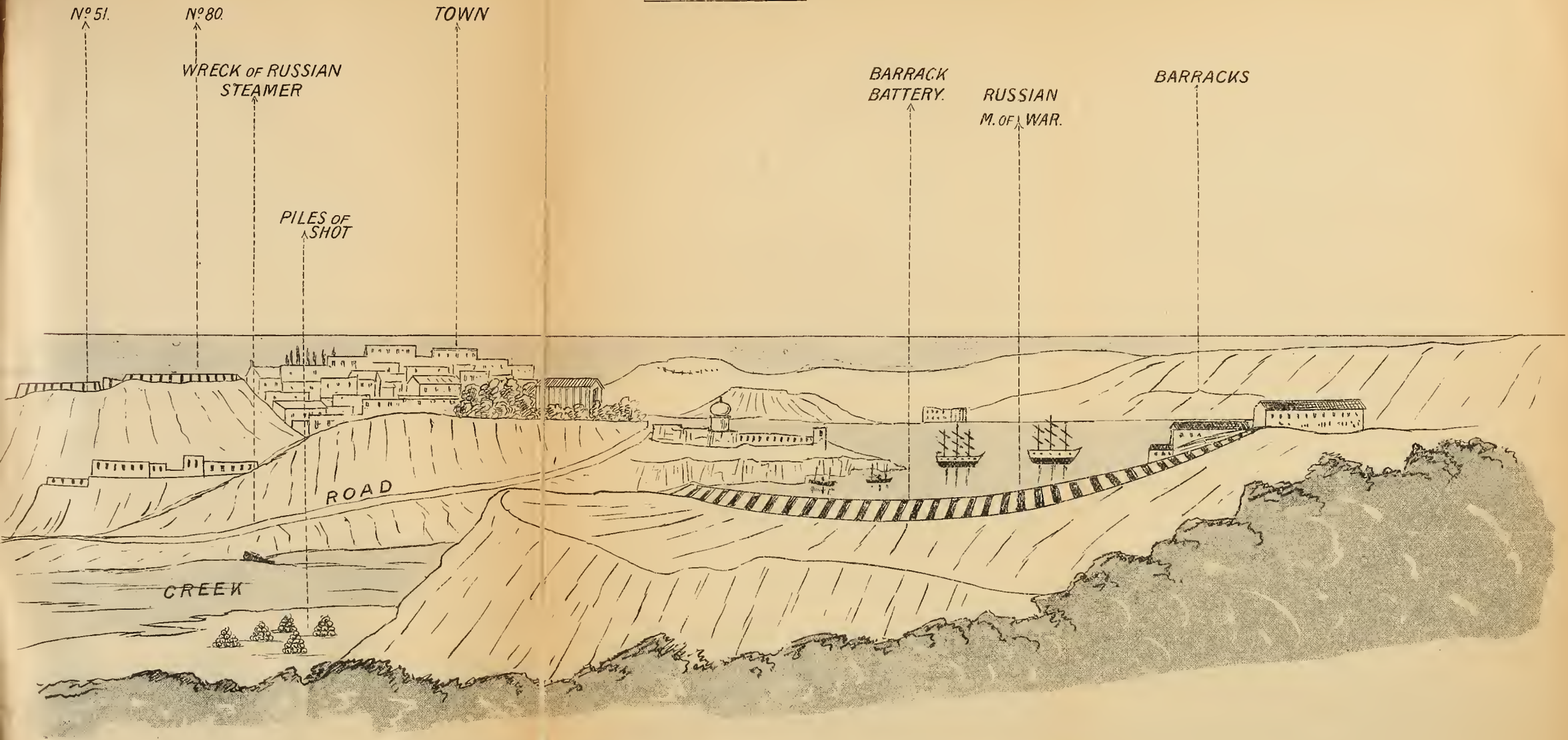




EK

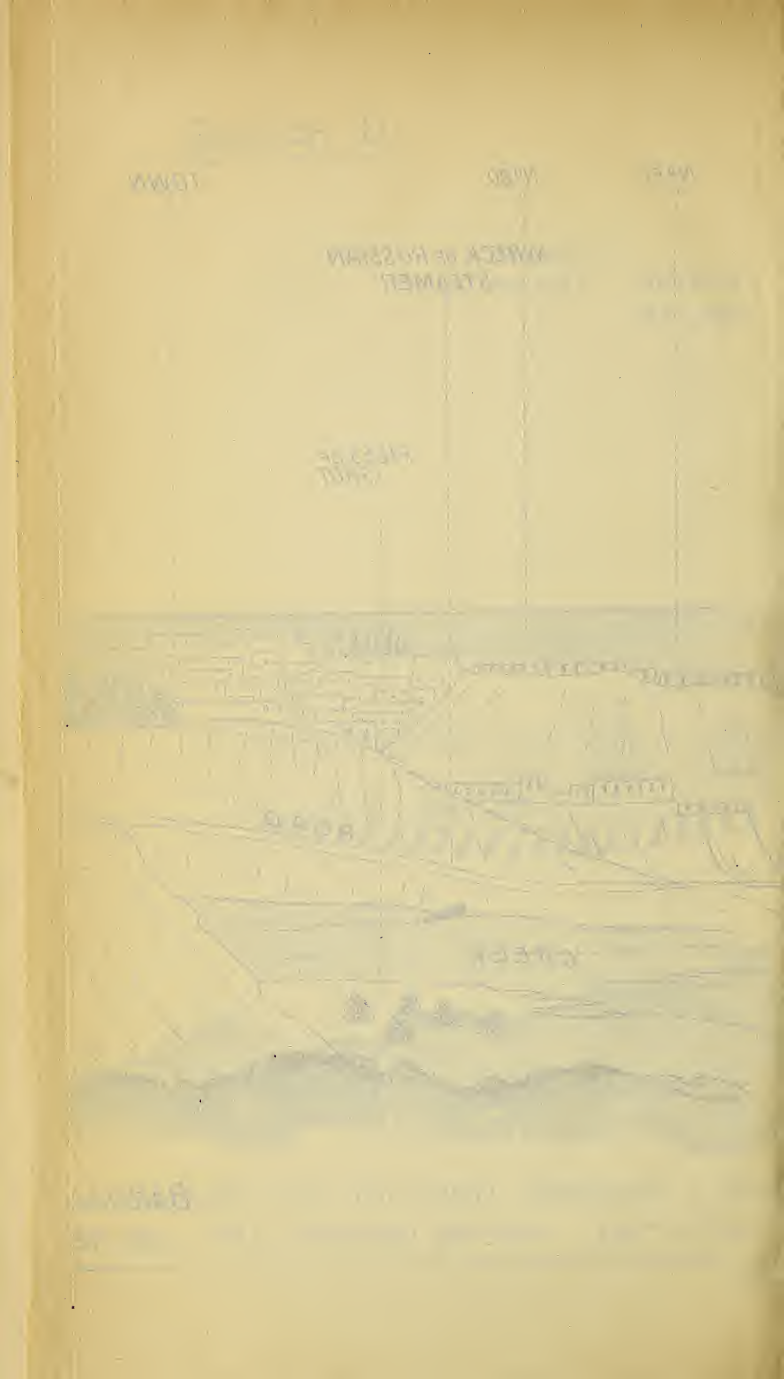
13th 1855, C.E.S. Scott, Lt R.A.

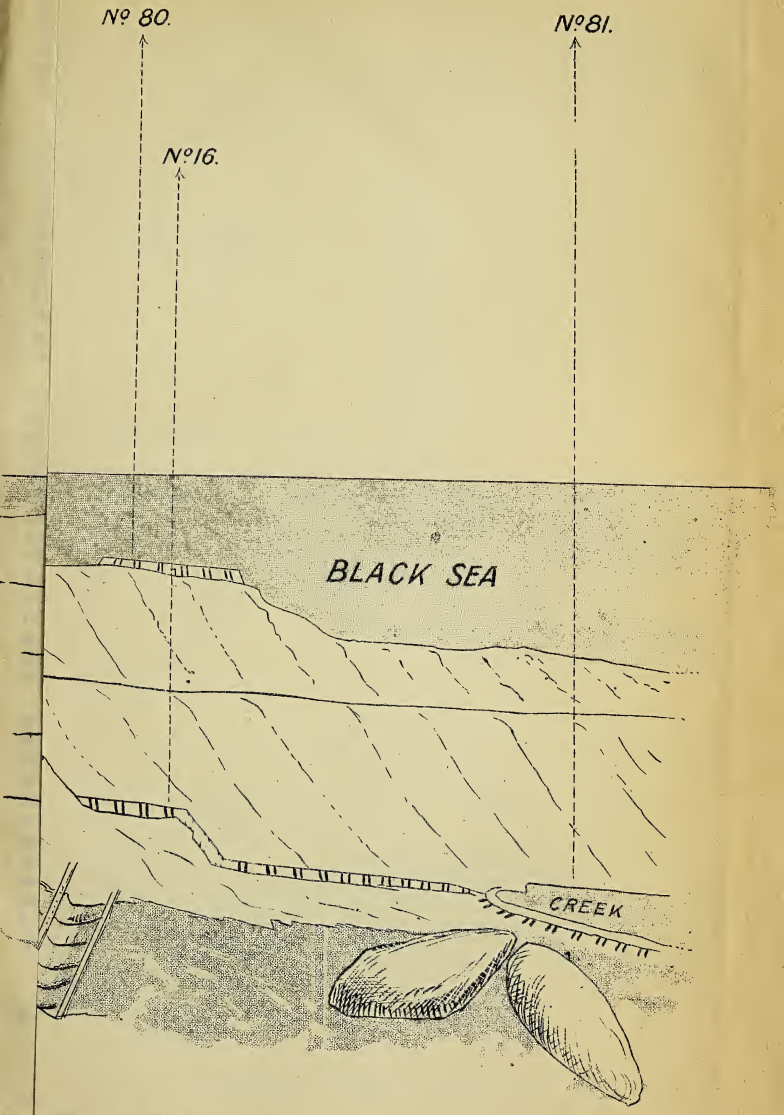
SKETCH II.



BARRACK BATTERY WITH THE TOWN, HARBOUR & CREEK IN REAR FROM No 13 (MORTAR) BATTERY, LEFT ATTACK.

July 13th 1855, C.E.S. SCOTT, Lt R.A.





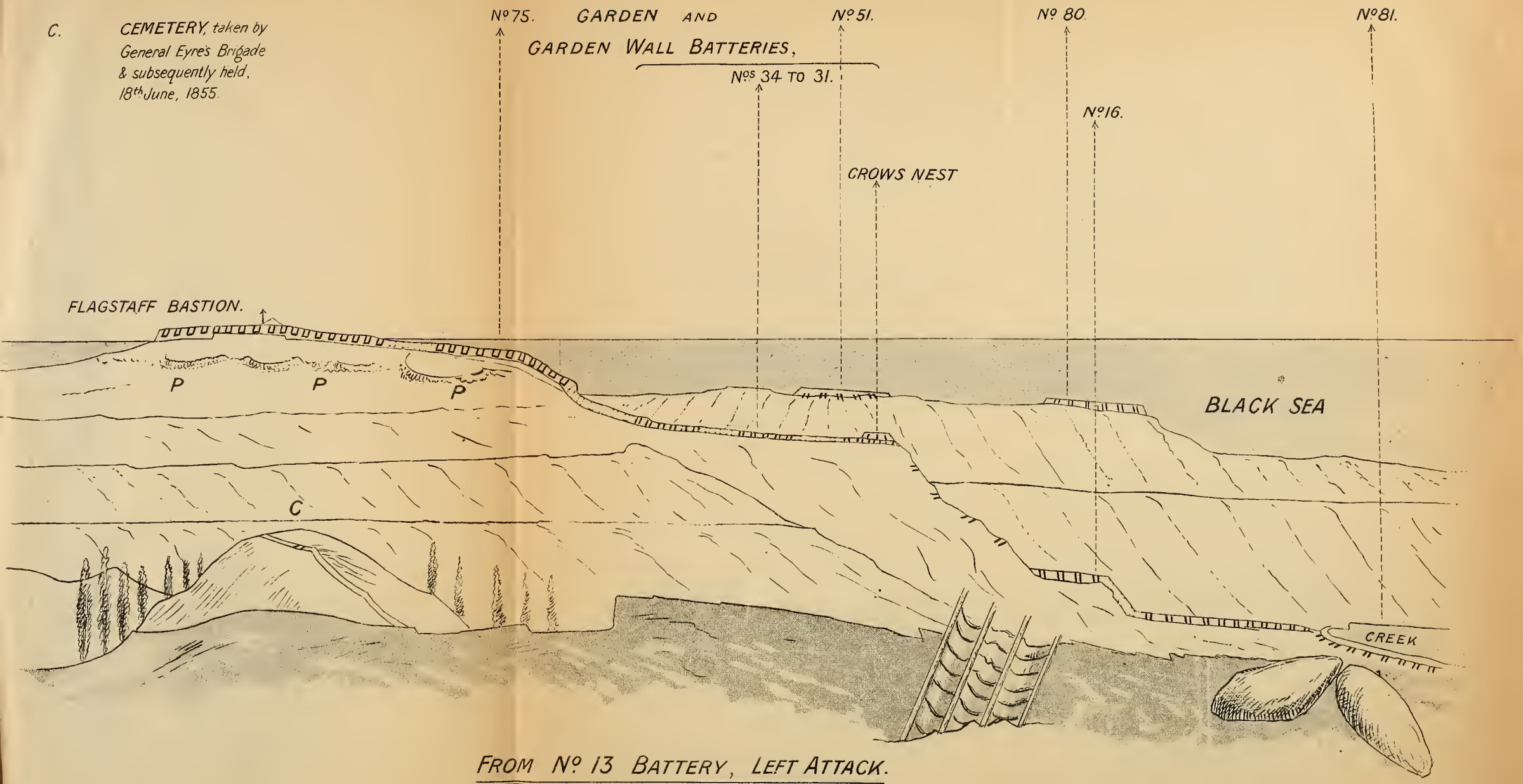
OTT, Lt R.A.

15th July. 1855.

SKETCH III.

P. P. P. RIFLE PITS.

C. CEMETERY, taken by General Eyre's Brigade & subsequently held, 18th June, 1855.



FROM Nº 13 BATTERY, LEFT ATTACK.

C. E. S. SCOTT, Lt R. A.
15th July 1855

of the siege by Captain (now General Sir) Michael Biddulph,* R.A., then an assistant engineer. Sketches II. and III. are contributed by Colonel C. E. S. Scott,† from "rough but accurate" drawings made by him at a later date. The three sketches are intended to give a general idea of the position, and are not supposed to depict exactly every particular embrasure, etc.

The Russian ordnance consisted of *Canons, Canon Caronades, Licornes* (Howitzers), *Caronades,* and *Mortiers.* The majority of pieces disposed along their front were *Canons* and *Canon Caronades* of 36 and 24, and they had also twenty-six 68-prs., two of which were in the Redan, and three in the Flag-staff. The calibre of their guns it will thus be seen bore a close resemblance to ours, and that the number they would bring to bear on the Left Attack, excluding the Creek batteries, was 128, to which we opposed but 65, though supported by those of the 67 pieces in the Right Attack which fired on the Redan. It must be remembered, however, that in April the Russians were very short of powder, and it is believed only fired from such of their guns as were most favourably situated. After having thus detailed the enemy's strength as compared with ours, we return to the bombardment.

As previously stated, it was fixed to begin in April, and accordingly on the morning of the 9th, as soon as the mist lifted a little, our batteries opened fire at about half-past 6 o'clock. The Russians were unprepared, and for some time did not reply, and then but slowly. The fire of the Allies during this day inflicted immense damage on the principal works of the enemy; but so great was his energy, and so vast were the resources of the fortress, that in spite of the continuous fire during the night from the mortars ‡ in the English batteries, by the following morning the whole of his works were repaired and re-armed. With regard to this point, it must be borne in mind that the Russians had their arsenal and ships of war close at hand, and their communications with their works were so good, as compared with the position of the Allies to their depôts, that these duties were far less laborious to them than to their adversaries. Still it is true that the constant shell fire by night was a very disturbing element and the work of the Russian very praiseworthy.

At this stage of the bombardment we come to the episode to which we wish to draw attention. For reasons already stated, the advanced batteries 7 and 8 were not armed when the cannonade began on the 9th, but during the night of the 11th, by most strenous exertions, four of the five 32-prs. detailed for the armament of No. 7 battery were got into position by a fatigue party, under Captain Oldershaw,§ and here, as an instance of the difficulties to be contended with, it may be mentioned that since the afternoon of the 8th, a period of seventy-two hours, the Royal Artillery had had but two reliefs, and in consequence, both officers and men were becoming exhausted from their exertions and over-work. However, the battery being armed, it was manned at 1 o'clock on the morning of the 12th by a party under 2nd Captain Lukin ‖ and Lieutenant Hall,¶ but with orders from Captain Oldfield** not to

* Kane's List, No. 2010.

† Kane's List, No. 2432.

‡ There were forty-one mortars of 13, 10 and 8 inch at this time in the two Attacks.—*Morning Reports of Attacks.*

§ Kane's List, No. 2337, now Major-General C. E. Oldershaw, C.B.

‖ Kane's List, No. 2170, now Major-General W. W. Lukin.

¶ Kane's List, No. 2404, Colonel W. J. Hall, died May 21st, 1896.

** Kane's List, No. 1879, Captain A. Oldfield was killed in the batteries before Sebastopol, August 17th, 1855.

open fire until the Engineers had put up the mantlets. This was not done till 4 p.m., when a few rounds (twenty-seven)* were fired by the 3 p.m. relief, during which time one mantlet was twice struck by shot, and finally blown away by its own gun. These mantlets, however, were not fixed in the usual manner, but merely balanced on a piece of wood laid across the embrasure ; the battery on this day was not much injured. At the morning relief on the 13th, the battery was manned by a detachment under Captain Oldershaw and Lieutenant Simpson,† and opened fire in company with the batteries in rear. No. 7 was quickly placed in a very trying predicament, for the Russians from their commanding positions soon concentrated upon it the fire of a number of guns. The duel was an unequal one, but was persisted in with decided success against the garden batteries,‡ and for five hours a hot contest was maintained, when the battery was compelled to cease firing. The affair is thus reported in the Royal Engineer Journal of the Siege :

"Left Attack, 13th April, 1855."

"Four guns in No. 7 battery which opened fire this morning were compelled to cease firing at about 11 a.m., being completely overpowered by the heavy fire brought to bear on them from the Upper Garden and the Town batteries. The embrasures and magazine, and the battery generally are much cut up. One of the gun carriages is disabled by the destruction of a wheel, and one gun struck by a shot, which I do not think has damaged it greatly. Lieutenant Graham,§ R.E., contused by a stone."

"Sd., H. D. Jones, Major-General,
Commdg. R.E., April 19th, 1855."

For the casualties in the Left Attack on the 13th, see foot of return No. 1.

* Morning State of Left Attack, April 13th, 1855.

† Kane's List, No. 2186, now Major-General W. H. Simpson.

‡ The "crows' nest," so called from its resemblance to a gigantic birds' nest, being built up with gabions and fascines, was silenced.

§ Now Lieut.-General Sir Gerald Graham, V.C., G.C.B.

No. 1.*—LEFT ATTACK.

MORNING REPORT — Shewing expenditure of ammunition and casualties in the Batteries against Sebastopol during the last 24 hours.

Camp, 14th April, 1855.

No. of Battery	Nature of Armament	Round shot	Hollow shot	Common shells	Spherical shells	Range in yards	Object Fired at	Apparent result	In the Batteries each Relief: Officers	In the Batteries each Relief: N.C. Officers & Men	Remarks
No. 1 Gun Batt.	2-8 in. Guns	43		22		1460	Redan and				
	10-24 pr. „	467				2200	Round Tower	Effective			
No. 2 Gun Batt. (Naval*)	2-8 in. „										
	8-32 pr. „										
No. 3 Gun Batt. (Naval*)	2-24 pr. „										
	6-32 pr. „								1st	Relief	
	2-8 in. „								11	284	
	1-10 in. „										
No. 4 Gun Batt.	3-24 pr. „	210			26	1700	Flagstaff and		2nd	Relief	
	3-32 pr. „	303				1950	Garden Bats.	Effective	11	284	
No. 5 Gun Batt. (Naval*)	1-10 in. „										
	1-68 pr. „										
No. 7 Gun Batt.	4-32 pr. „	240				1170	Up. Garden Bts.	Effective			
	1-24 pr. „					1500	Garden Wall				
Picket House ...	2-32 pr. „	148				1700	& Barrack	Effective			
	3-10 in. Morts.			97							
Right Mor. Batt.	6-13 in. Mortars			275			Redan & Barrck.	Effective			
Centre Mor. Bat.	4-13 in. Morts.			147			Garden Tower				
	4-10 in. „			150			& Redan	Effective			

KILLED.

Co. Batt. —

549...7...12...Sergt. Alex. Jamieson.
6...12...Gunr. James Birch.
31...6...12...Sergt. John Sutherland

WOUNDED.

Co. Batt. —

836...7...12...ac. Bomb. Jas. Lloyd.
1310...7...12... „ Alex. Adams.
1433...7...12...Gnr. Thos. Tear.
7...12... „ Wm. Sinclair.
7...12... „ Wm. Grant.
7...12... „ Thos. Martin.
4... 2...Bomb. Alf. Brown.

Signed, E. C. WARDE,
Lt.-Col. R.A.,
Commg. Siege Train.

Casualties to Guns & Carriages.

1-32 pr. disabled, wheel broken.
No. 3 gun, 4 battery, struck by a shell, quoin and stool bed broken.
1 mortar cannot be used on account of quoin being broken.

Signed, A. OLDFIELD,
Capt. R.A.,
Commg. Left. Attack.

* NOTE.—The Navy had to furnish a daily return of the ammunition expended to the Royal Artillery, but there were disputes about it which will account for no expenditure being shown from their batteries on this day. The return was probably not rendered.—(F.A.W.)

During the night of the 13th, the damage was repaired and the armament of No. 7 made up to five guns; No. 8 also receiving its complement of six 32-prs. At 1 a.m. on the 14th, both were manned, No. 7 by a detachment under Captain Charles Henry† with a subaltern, No. 8 by one under 2nd Captain Walcott‡ and Lieutenant Torriano.§ As soon as it was light enough, the whole of the batteries of the Left Attack opened fire. The Russians, satisfied with their success of the previous day, pursued the same tactics, and concentrated the fire of a number of guns on the advanced batteries, the Redan

* The Officer commanding the Siege Train forwarded daily throughout the siege to Royal Artillery headquarters, a Morning Report, giving particulars concerning both attacks. The A.A.G.R.A., Lieut.-Colonel (now General Sir John) Adye, kept copies of those returns, and through his kindness those for April 14th and 15th are given.—(F.A.W.)

† Kane's List, No. 1988. Major C. S. Henry lost his right arm in the batteries before Sebastopol, August 17th, 1855. He died a Lieut.-General and C.B., October 15th, 1892.

‡ Kane's List, No. 2174. Major C. E. Walcott embarked with No. 7 Co., 14th Batt. for Calcutta, August 12th, 1857. He served in the Indian Mutiny, and met his death out tiger shooting, by the accidental discharge of his rifle near Ahmedabad, May 16th, 1868.

§ Kane's List, No. 2300. Now Colonel C. E. Torriano.

proving a most formidable antagonist, for within half-an-hour, the muzzles were knocked off two of the guns in No. 8. In this battery, probably from the work having been done hastily and at night, the sills of the embrasures had unfortunately not been cut deep enough to enable the guns to be correctly laid. This was especially the case when efforts where made to fire at the battery at the head of the Creek, which covered a bridge, over which the Russians were continually passing, and which swept a small cemetery which our troops would have occupied in the event of an assault.* It was impossible to alter these embrasures, because the fire of the enemy was too hot, and because the soil, with which the parapet was made, was so rocky and hard that though the shot from the guns impinged on the sill of the embrasures, little effect was produced in blowing away the obstructive portion, which deflected the shot in their flight, and marred in a great measure their effect. It was an untoward circumstance, and the Engineer Officer on duty, Lieutenant Charles Gordon,† was extremely distressed. In the course of the morning, the Adjutant of the Attack, Lieutenant Ruck Keene‡ came down to see how matters were going on. Nothing however could be done but to make the best of the situation, and the guns were steadily served until the arrival at 3 p.m. of reliefs under 2nd Captain Philip Dickson § with Lieutenant Briscoe ‖ for No. 7 battery, and 2nd Captain Lukin with Lieutenant Harris ¶ for No. 8. As the day wore on the Russians in no wise relaxed their exertions, and very shortly after the arrival of the reliefs, another gun in the latter battery was disabled, Harris, at the moment, being in the act of laying it. In spite of all difficulties the fire from the remaining serviceable guns was, nevertheless, continued until dark, when they were placed under cover, and others mounted to replace those disabled, after which the men and officers, thoroughly fatigued and exhausted, returned to camp.

The fighting in the advanced batteries on the 14th inst., is thus reported in Engineer journal of the siege.

"Left Attack, April 13th, Night."

"On duty, Captain Hassard and Lieutenant C. Gordon, R.E., No. 7 battery, repaired and armed. No. 8 armed, and six embrasures cut through."

April 14th, Night.

"Battery No. 8 opened fire this morning in company with No. 7, but were overpowered by the heavy fire brought against them, they however continued a fire from one or two guns until dark. It is impossible not to admire the gallant way in which the Artillery Captains, Henry and Walcott, and the officers and men under their command, fought these batteries, under the very disadvantageous circumstances in which they were placed.

Let this be extracted for me: Sd. Raglan.

Sd., Harry D. Jones, Major-General,
Commdg. R.E., 19th April, 1855."

For the casualties in the Left Attack on the 14th, see foot of return No. 2.

* This Cemetery was occupied by General Eyre's brigade on June 18th.
† Later, Major General Gordon, killed at Khartoum in 1885.
‡ Kane's List, No. 2337. Now Major-General Ruck Keene.
§ Kane's List, No. 2161. Major Philip Dickson, retired, October, 1864.
‖ Kane's List, No. 2401. Major W. W. Briscoe, died 12th February, 1876.
¶ Kane's List, No. 2399. Now Lieut.-Colonel N. H. Harris.

No. 2.—LEFT ATTACK.

MORNING REPORT—Shewing expenditure of ammunition and casualties in the Batteries against Sebastopol during the last 24 hours.

Camp, 15th April, 1855.

No. of Battery	Nature of Armament	Round shot	Hollow shot	Common shells	Spherical shells	Range in yards	Object fired at	Apparent result	In the Batteries each Relief: Officers	In the Batteries each Relief: N.C. Officers & Men	Remarks
No. 1 Gun Batt.	2-8 in. Guns	254		102		1460	Redan, Tower,				
	10-24 pr. "	708				2200	and Barrack				
						1700	Batteries.	Effective			
No. 2 Gun Batt. (Naval)	2-8 in.	180	sh't	sh'l							
	8-32 pr. "	700	"	"			Redan, Barrack & Garden Batteries.				
No. 3 Gun Batt. (Naval)	6-32 pr. "	120	"	"							
	2-8 in. "	590	"	"							
	1-10 in. "	200	"	"			Flagstaff and Garden Bats.	Effective	1st	Relief	
		40	"	"					11	316	
No. 4 Gun Batt.	3-24 pr. "	174				1700					
	3-32 pr. "	188				1950	" "				
No. 5 Gun Batt. (Naval)	1-10 in. "	30	sh't	sh'l			Flagstaff Bats.		2nd	Relief	
	1-68 pr. "	100	"	"			Flagff. & Gar. B.		11	309	
Picket House *	1-24 pr. "										
	2-32 pr. "	190			16	1500	Bs. left of Gar. B.				
	3-10 in. Morts.			16		1700	Barrack				
Right Mor. Batt.	6-13 in. Mortars			284		1460	Redan and				
Centre Mor. Bat.	4-13 in. "			106		1700	Barrack Baty.	Effective			
	4-10 in. "			183		1400	Rdn. & Gar. Wall				
No. 7 Gun Batt.	5-32 pr. Guns	864				1170	Garden Battery				
No. 8 Gun Batt.	6-32 pr. "	445				780	Redan and				
						750	Barrack				

KILLED.

Co.	Batt.	
3	12	Corporal Wm. Boyd.
3	12	Gunr. James Lawley.
8	4	" Hy. McQuillan.
7	12	" George Jones.

Casualties to Guns, Carriages, &c.

1-24 pr. vent injured.
1-24 pr. dismounted.
1-24 pr. disabled
3-32 prs. disabled.
1-32 pr. carriage disabled.
The 4-10 in. Mortar quoins require replacing.

WOUNDED.

Co.	Batt.		
3	12		Gunner John Ivis (severely).
4	2	"	John Young (severely).
4	2	"	Henry Langley (severely).
4	2	"	John Spence (slightly).
4	2	"	George Harper (slightly).
4	2	"	Richard Wright (severely).
4	2	"	George Parkinson (slightly).
4	2	"	Thomas Craig (severely).
8	7	"	John Taggart.
8	7	"	James Stewart.
No. 2983	8	7	Sergeant Angus Clark.
" 1603	2	11	Gunner James Robent.
	2	11	" James Sharpe.
No. 1503	6	12	" George Stewart.
" 577	6	12	" John Hutton.
	6	12	" John Chappell.
No. 680	6	12	Bombadier Matthew Crowdy.
	3	12	Gunner Thomas Jordan.
	4	2	" Thomas Holden.

Assist.-Surgeon R. M. Cockerill (slightly).

Signed, E. C. WARDE, Lt.-Col. R.A., Commg. Siege Train.

Signed, A. OLDFIELD, Capt. R.A., Commg. Left Attack.

* NOTE.—At one time the guns in the Picket House Battery were manned by the bluejackets of H.M. Ship "Wasp." After the winter of 1854 the R.A. found all detachments for this battery. All Mortars, except one sea service manned by the Navy, were served by the Royal Artillery.—(F.A.W.)

A few days later, Lord Raglan directed his approval to be made known to those concerned. Accordingly, the following order was issued on the 23rd.

"The Brigadier-General Commanding* has great pleasure in publishing to the Officers, N.-C.-Officers, and Men of the Royal Artillery, the following remarks made by F.M. Lord Raglan, on the conduct of Captains Henry and Walcott, and the Officers and Men under their command, whilst manning the guns in Nos. 7 and 8 batteries, Left Attack, on the mornings of the 13th and 14th April."

* Kane's List, No. 1668. Later F.M. Sir Richard Dacres, G.C.B., died December 6th, 1886.

"Colonel Dacres will be so good as to communicate with Captains Henry and Walcott, and express to them not only my approval of their conduct, and that of the Officers and Men under them, but my warmest thanks for their gallantry and steady perseverance in the discharge of their duty."

Sd., Raglan.

The Officers referred to are as follows :—

2nd Captain	Oldershaw.	Lieutenant	Simpson.
„ „	P. Dickson.	„	Torriano.
„ „	Lukin.	„	Harris.
		„	Briscoe.

"By order.

John Adye,* Lieut.-Colonel, A.A.G.R.A."

After the experience of the 13th and 14th, it was clear that although receiving every support from the batteries in rear, the advanced batteries could no longer now be used to any good purpose ; they were reduced to a state of ruin, and were therefore ordered not again to be manned during the April bombardment.†

The fighting on these two days was a success for the enemy, and was so considered by them. Todleben ascribes it to the fire from Bastion, No. 3, which he says "continued to fight with success against the English," yet it would seem from what we can gather, that that work, and its adjacent batteries, mostly directed their fire on No. 8, while it was the Town and Garden batteries that were principally engaged with No. 7, but however that may be, those who contended with the Russian Artillerymen and Sailors on this and other occasions, fully recognised the skill and resoluteness of their opponents.

The bombardment lasted until the 19th, when the fire was gradually discontinued. The casualties in the English army during these ten days were 265. Among the personnel and matériel of the Left Attack siege train, the loss amounted to : killed 13, wounded 25, guns disabled 15, damaged 11.‡ That the loss was so small, must be attributed in a great measure, to the skilful manner in which the parallels and boyaux were layed out, and to the sound substantial work in the construction of the batteries and magazines by the Engineers, and also to the fact that the projectile principally used by the Russians was round shot ; had they used a larger proportion of shell, especially on the 13th and 14th, matters might have been very different. The question of casualties with them, was much more serious. Compelled from the constant expection of an assault to keep the troops covering their works close at hand, they were continually exposed to a deadly fire, which, during these ten days, resulted in a loss of upwards of 6000 men. That no assault at this period of the siege was attempted, must be set down to the influence of the Emperor of the French, who desired to modify the plan of campaign as hitherto followed. He advocated placing a field army in the Crimea, which should sever the communications between Sebastopol and the interior, believing that such an arrangement would

* Kane's List, No. 1891. Now General Sir John Adye, G.C.B.

† At a future date, it may be possible to follow the fortunes of these batteries through other parts of the siege.—(F.A.W.)

‡ From the Morning States of the Left Attack, between the 10th and 20th April, 1855.—(F.A.W.)

soon compel the surrender of the place. While such a scheme was in contemplation, it was considered unadvisable to risk the loss of life and prestige, which such an attack, if unsuccessful, must have entailed. This was one of many embarrassing incidents that happened during the war, the result of divided command and counsel, which must ever be a drawback to the harmonious action of allied armies in the field under independent individual control.

In touching on these incidents in the siege of Sebastopol, it may here be remarked, that in most of the numerous wars in which the Royal Artillery have participated, the more active, and therefore the most distinguished part, has usually devolved on the Field Artillery, but in the Crimea, owing to the vast proportions of the siege, it was otherwise, and consequently, the most important duties fell to the lot of the officers and men of the Garrison Artillery. During the eleven months the siege lasted, they were constantly by day and night, in the trenches, exposed to the fire of the enemy and the inclemency of the weather, and they endured severe hardships from excessive toil, aggravated by bad food, insufficient clothing, and scanty shelter. These trials were patiently suffered throughout, and further, to their credit be it said, their duties were at all times unflinchingly performed.

When the siege train left England for the East, in April, 1854, only three garrison companies, Nos. 6, 7 and 8 of the 11th Battalion, under Captains D'Aguilar,* Gambier,† and Fitzroy‡ respectively, accompanied it: but as the siege progressed and grew in magnitude, these were continually added to, until, when the place fell, there were present with the army, twenty-nine Companies of Garrison Artillery, numbering 3,300 officers and men, ably assisted in the siege batteries by about 1,100 officers and men of the Royal Navy.

The Crimean War having been waged against a powerful European State, is the most important campaign in which the British army has been engaged since led to uninterrupted victory by the Duke of Wellington, who crowned its triumphs by the defeat of Napoleon at Waterloo. It is noticeable that the conditions of warfare in 1854, were much the same as at the beginning of the century, though the use of Minié and Liége rifles and Lancaster guns, and the application of steam as a motive power and of armour plates§ for the defence of warships, was an indication of the great changes which have since taken place in military and naval science. From this point of view, the campaign may be regarded as a link between the old and the new order of things. Those who served in the war, and reflect on its vicissitudes, will feel that a tribute of praise is justly due to the soldiers of the Allied and Russian armies, for their patient endurance under many hardships, the faithful performance of trying duties, and indomitable courage on frequent occasions. All these qualities are deserving of frank acknowledgment. Of our own troops, it can be said without fear of

* Kane's List, No. 1911. Now General Sir Charles L. D'Aguilar, G.C.B. No. 6 Company, assisted by some men of No. 7, with some horses from the Grey Battery, brought up and served the two 18-pr. guns, which rendered such important service at the battle of Inkerman.

† Kane's List, No. 1783. Lieutenant-Colonel Gloucester Gambier, was severely wounded with the 18-pr. guns at Inkerman. He died a Major-General and C.B., March 9th, 1872.

‡ Kane's List, No. 1933. Major A. C. L. Fitzroy, died on September 10th, 1855, from wounds received during the Assault of Sebastopol on the 8th.

§ At the attack on Kinburn in October, 1855, the French had three floating batteries protected by armour plates.

contradiction, that the behaviour of the Infantry at Alma and Inkerman, of the Cavalry at Balaclava, and of the Artillery in the siege batteries and at the battle of Inkerman, were worthy of the best fighting traditions of the British Army.

CHADDESDEN MOOR, DERBY.
8th September, 1897.

NOV 22 1897
U.S. PATENT OFFICE

MOUNTINGS FOR COAST ARTILLERY.

BY

LIEUT.-COL. SIR G. S. CLARKE, K.C.M.G., F.R.S.

In a recent paper Major-General J. B. Richardson has entered a powerful "plea for speed in firing with garrison guns," and has indicated the many causes which combine to retard the rate at present attainable. Out of nine such causes, three at least directly concern the department for which I am responsible, and I think it may be useful to state briefly the steps which have been taken—in anticipation—to meet General Richardson's demands.

It has fallen to my lot to be brought into contact with the Garrison Artillery at many stations at home and abroad, to have been present at six of the annual naval manœuvres, and to have seen quarterly practice carried out by ten of Her Majesty's ships. I need not say, therefore, that I cordially agree with General Richardson's conclusions; or that I have endeavoured, as far as possible, to remove the ground of his criticisms. The deplorable divorce of the manufacturing establishments from the Army, which they exist to serve, has naturally given rise to difficulties previously non-existent. General Richardson considers that the factories "do their best," but intimates that they do not know the "wants" of the Garrison Artilleryman and that their thoughts are not as his. This may well be the case; but the conditions which imply high or low speed of fire range far beyond the province of the manufacturer. To him, the problem is not nearly so simple as that of designing a mounting for a given gun with a view to insure the maximum rapidity of service.

At first sight, it must appear that this condition is more easily fulfilled in a coast battery than on board ship. This, however, is not the case. Handiness, compactness and lightness are essential on board ship. Space is limited and special structural considerations arise. On the other hand, the requirements of the naval gunner are less comprehensive than those of the Garrison Artillery. His gun is practically an independent unit, since director firing is happily passing out of favour. Cases II. and III. do not therefore trouble the designer. Again, the naval gunner accepts perforce an amount of exposure which would not be justified in the case of a coast battery. If, by the application of some suitable form of X rays, the men engaged in handling and supplying the guns on board a ship in action could be rendered visible, the effect would be surprising, and the Garrison Artilleryman would realise his enormous advantages. The dark

and apparently massive sides of the vessel would in great measure disappear and, except in the case of turrets and barbettes, a large number of men would appear to be nakedly exposed. Their real position is of course even less favourable than that disclosed by the X rays; because an ideal bursting screen is placed in front of them. The tendency in later war ships, including cruisers, is to give shield protection to the numbers actually working at the gun; but such protection does not extend to a large number of men employed in serving ammunition and essential to a high speed of fire. The designer of a coast mounting dare not contemplate such a measure of exposure as occurs on ships of war. Otherwise an advantage important to the garrison gunner would be abandoned. While I strongly hold that well-directed fire is the best protection, I think that cover which does not interfere with the effective handling of the gun ought not to be abandoned. In this connection, it is desirable to remember that the size of the targets for naval prize firing is :—

Turret and barbette guns	636 sq. feet.
Q.F. guns	335 „ „

The ranges being respectively 1400–1950 and 1400–1620 yards. On the other hand, the targets presented by the latest 9·2-in. and 6-in. L.S. barbette mountings and guns are :—

	9·2-in.	6-in.	
Broadside... ...	115 ...	38 ...	sq. feet.
End on	49 ...	18 ...	„ „

The above figures tell their tale; but I doubt whether the extremely small size of the target offered by a well mounted gun is sufficiently realized. O'Hara's tower at Gibraltar, which was hit at the third round by a 5-inch shell fired from H.M.S. *Wasp* at anchor in smooth water, was relatively monstrous.

Setting aside turrets, which I consider neither necessary nor desirable on land, two general forms—barbette and H.P., to which General Richardson alludes—present themselves. In designing the first, it becomes an object to provide reasonable protection for the numbers at the guns, and complete protection, against direct fire, for all other men employed in the service of ammunition. The last condition entails a parapet not less than six feet high. It follows that the mounting must be raised above the level at which ammunition is handled and thus something of the nature of a drum, "partially filling" up the emplacement, is arrived at. It further results that men have to climb up to their work at the gun from the lower level. I am not here defending the very inconvenient mountings which are sometimes met with; but only seeking to point out the rational process by which a particular arrangement was reached. "All loading, traversing and elevating arrangements are simplified by low mountings," as General Richardson states; but, in practice, a variety of qualifying conditions arise, and it is generally quite impossible to take the emplacement floor as representing a ship's deck and to install a naval mounting upon it.

As regards high sites, I entirely agree with General Richardson and have for many years advocated their adoption[1] wherever the ground permits, even if some small sacrifice of range is entailed.

The disappearing principle offers certain attractions. In ordinary circumstances, it affords almost absolute protection to men and *matériel* against such fire as ships are able to deliver. Provided that the ship remains within range, a gun so mounted ought to be able to go on steadily hitting without let or hindrance. The technical drawbacks of the existing H.P. mounting are well known. As General Richardson points out, it "is apt to get out of order, is expensive and needs much care and training." On this account and also because it has, in some cases, been adopted for unsuitable sites and mounted without any regard to its special characteristics,[2] it has naturally fallen into disfavour. The all-round pit with the unnecessary cramping of space involved is distinctly objectionable. The present sighting arrangements—all important to effective and rapid fire—can only be described as rudimentary. I hope to show, however, that these and other defects are capable of remedy, and that a relatively high speed of fire is attainable by an improved application of the disappearing principle.

Having seen the working of coast mountings at many stations, and having had the advantage of hearing the criticisms of officers of the Garrison Artillery, I derived the general impressions that :—

(*a.*) Mountings were too cumbrous, this arising partly from the fact that—

(*b.*) Recoils were unnecessarily long.

(*c.*) The arrangements for loading and handling projectiles were inconvenient.

(*d.*) Sighting and its relations to training and elevating were unsatisfactory.

Here were definite lines on which to attempt improvement as opportunity offered, and I will attempt to describe briefly some of the results attained. This is desirable, because the present demand for coast mountings is not large and many years must elapse before the Regiment, as a whole, becomes familiar with new types. It may seem, therefore, that as General Richardson implies, little progress is being made in the direction of meeting his requirements. The following mountings, which I have designed during the past three years, have been made or are under manufacture :—

I.—*6-in. barbette, Mark II.* (Plate I.).

In order to avoid filling up the emplacement, the gun is placed on a cast-iron pedestal which carries the steel racer path and a live-roller ring 6 ft. 6 in. in diameter. The recoiling carriage consists only of buffers

[1] *See* "*The protection of heavy guns for coast defence*," "Proceedings" R.A. Institution 1886. Most of this paper was written in 1883.

[2] *See* "*Fortification*," 1890.

of what are generally regarded as the Vavasseur type[1] supporting the gun trunnions. The slide is inclined at an angle of 9° to allow the gun to run up after firing, and the recoil is about 2 ft. 5 in. A steel shield 3 in. thick, sloping at an angle of 33°, is supported from the platform and the front of the slide. The general result is an extremely compact mounting.

The training arrangements are duplicated, one set of training gear being placed on the right front of the mounting and worked under complete cover from the emplacement floor, the training arc (D) being close to the eye of the training number. A second training station (A) is provided on the loading platform. The elevating gear is also on the right front of the mounting and is worked under cover, an indicator dial (E) being attached to the recoiling buffer and driven by a chain from the trunnions. Chain gear is open to objections unless the tension is carefully adjusted, and I have since come to the conclusion that a sin gle bronze band pulling the dial round against a spring is a better arrangement. In order to check the elevation indicator at any moment, a stop can be provided on which the gun rests at extreme depression.[2] If this depression is once carefully ascertained by clinometer and marked on the dial, the latter can be checked at any time by simply depressing the gun to the stop and adjusting the dial if it does not read correctly. Thus, unless the emplacement alters its level, a clinometer need never be used and the group commander can at any time satisfy himself in a few seconds that the indicator is reading correctly. Training and elevating gear works with perfect ease. Cases I., II. and III. are thus provided for; but the laying number can train only. Thus, when employing Case I., he must, by word or signal, direct the elevating number, while himself working the training gear. In Case II., he lays for line only and has full control of his gun. In either Case, I. or II., he can fire with his eye over his sights —a point which I regard as extremely important.

For loading, a platform 4 ft. broad is provided, access being given by two comfortable curving staircases, one on each side. As shown in Plate I., the mounting was specially arranged so that its loading platform abuts against a fixed loading stage in the emplacement. This has the advantage that the mounting will traverse through a complete circle. In the case of two of these mountings, however, the loading

[1] I am not able to ascertain the date of the earliest instance of this arrangement of a recoiling buffer carrying trunnions. The first R.C.D. official drawing showing this arrangement is dated 12th March, 1880, where an exactly similar plan to that shown in Plate I. was applied to a proof truck for 10·4-in. and 12-in. guns. There are, however, sketches of earlier date. The first Vavasseur drawing which reached the department—a design for the mounting of a 25-pr. R.B.L. gun—is dated 29th October, 1880. It is clear, therefore, that this arrangement was independently invented in the R.C.D. The question of the invention of a buffer giving uniform resistance is more important. The "Naval Gunnery Manual, Part II., 1895," roundly states: "Hydraulic brakes which offer a uniform resistance . . . exist in several different forms, but the principle of action is the same in all. They were originated by Mr. Vavasseur, and, in whatever form they exist, are essentially Vavasseur brakes." This is quite inaccurate. The uniform resistance brake was first invented in the R.C.D. in the form in which it now exists, and the later rotating disc arrangement, introduced by Mr. Vavasseur, has been abandoned for the earlier R.C.D. form with a valve key. To state these facts is in no sense to disparage the excellent and original work of Mr. Vavasseur.

[2] In the Mark I. 6-inch quick-firing mountings these stops are fitted.

platform is carried further to the rear, and no fixed stage is required. The cartridges must be handed up from the emplacement floor. The shell are placed in the carrier (H), attached to an arm standing out from the straight derrick (K). By turning the winch handle (L) the shell carrier rises and then begins to circle round automatically until the carrier enters the breech. The shell is then rammed home off the carrier; or the shell can be raised into a ready position previously, the lift being completed and the arm supporting the carrier swung round when the loading numbers are ready. In either case, there ought not to be any delay in the supply and no handling of the projectile on the loading platform is necessary. At the same time, no loading tray is required. With drilled men, I believe that there will be no difficulty in maintaining an average rate of fire of a round in about 40 seconds, using either Case I. or Case II.[1] This estimate, however, assumes that ranges are quickly transmitted to the emplacement, and that there are no delays external to the gun and mounting. Some advantage would lie with Case II. since it is an easier and simpler operation to work to an indicator dial than to adjust a gun sight. At the same time, laying for line is in itself a quicker and simpler operation than employing the tangent sight.

A glance at the comparative sketches, Plate II., shows that the mounting above described marks an advance in compactness and general handiness.

II.—*6-in. B.L. or Q.F. barbette with axial recoil* (Plate III.).

The conversion of the 6-in. B.L. gun to Q.F. having been very successful, the probability of converted guns eventually coming from the Navy into the land service arose. At the same time the Q.F. gun was being adopted for coast artillery. A Q.F. gun without a suitable carriage loses most of its advantages. It seemed desirable, therefore, to propose a mounting which could be used with the B.L. or converted gun and rendered applicable at any time to the Q.F. gun. To meet these conditions, the adoption of axial recoil was necessary. Plate III. shows the resulting design. A vertical forged steel pivot (A) is dropped into a cast-iron pedestal (B) from which it projects, having at the top a circular recess containing steel balls. The carriage is a steel casting of U form, providing a socket below which fits over the pivot. Thus the gun and cradle are simply hung upon the pivot, the weight being taken by a steel cover plate (C) which rests on the balls. By depressing the gun and loosening the screws in the cover plate the weight of the gun and carriage comes directly on the pedestal (B). The plate can then be removed and access to the balls is obtained at any time without dismounting the gun.[2] In the excellent Elswick 6-in. naval mountings, a long stem projecting from the under side of the carriage rests upon balls, to which access is obtained from the

[1] The operations involved are not in the least fatiguing, with the exception of the service of the derrick. This number would require relief if a high rate of fire were maintained; but he has the advantage of being well covered and of working without any restraint due to cramped space.

[2] This modification of the Elswick pedestal mounting, important from the land service point of view, was patented by a private firm some months after it existed in the R.C.D. shops.

deck below. This arrangement is not adapted, therefore, to the land service. The trunnions of the B.L. gun are housed in metal castings which slide in grooves cut in the cast-steel cradle, and a lug, forming part of a ring, shrunk on to the breech gives an attachment for a cross-head actuating the buffer rod and two trains of springs. This ring is the only alteration required to the gun. The recoil is about 13 in. and the gun, after firing, is instantly run up by the springs.

It seemed desirable to provide an alternative training gear, which is absent from the latest naval pattern mounting. While, therefore, the laying number has close to his hand a slow motion gear working through a worm, a supplementary quick spur training gear is added on the right side. A friction clutch actuated by a hand wheel disengages the worm gear and enables the training to be done from the right side. The slow gear will easily turn the mounting through 360° in one minute; the quick gear requires only 20 seconds.

A bar and drum sight is attached to the cradle on the left side, which could be duplicated on the right side; or an auto-sight could be provided. A supplementary straight-edge foresight folding down is added to meet the requirements of Case II.[1] The elevation indicator is a drum close under the eye of the laying number and actuated by a tape from the cradle trunnions. Training angles are shown on a similar adjacent drum. The laying number stands on a step forming part of the mounting, and has both elevating and training gear close to his hand. The operations of loading are performed from a fixed loading stage.

The projectiles and charges have to be handed up by numbers standing on the emplacement floor, and the conditions seem quite as favourable to rapid fire as those on board ship. I hope that a speed of 1·5 rounds per minute will be attainable with the B.L. gun, two rounds with the B.L. and Q.F. gun and five rounds with the Q.F. gun.

The first Q.F. mounting (Mark I.) is very similar in design to Plate III., but somewhat more compact since the gun is trunnionless. In the latest Mark II. design (Plate II.), the gear is differently arranged so as to be completely protected on the broadside by the curved shield while the elevation indicator is placed below the shield so that it can be read by an officer on the emplacement floor. The Mark II. mountings, which are under manufacture, will be extremely neat and compact. They will have auto-sights on the left side, and the training and elevating wheels will be on the same spindle. There is alternative gear worked from the emplacement floor. The 4·7-inch Q.F. mounting is very similar.

III.—*9·2-in. B.L. barbette, Mark III.* (Plate IV.).

Here also the mounting is placed upon a cast-iron pedestal, built up in two parts. By this means a large bearing surface upon the concrete foundation is secured, and, at the same time, the emplacement is not inconveniently filled up. The service 6-in. H.P. racer path is

[1] I believe that for Case II. a straight-edge foresight and a V backsight is greatly preferable to two straight-edges.

placed on the top of the pedestal.[1] The carriage is of simple construction, two brackets supporting the slide, being built up from strong bolsters. The buffers are similar in design to those of the 6-in. barbette, but the trunnions rest in ball bearings. The recoil is about 39 in.

There is a traversing and elevating gear at the left front of the mounting under full cover of the parapet and shield. The left sighting platform has both gears, and the right platform traversing gear only. Training arc and a special elevation indicator are provided, in full view of the numbers employed at the under-cover station. The laying number standing on either sighting platform can indicate by a pointer the direction in which he requires the gun to be traversed. As soon as the sigh is approximately "on," however, he will halt the training numbers and complete the laying with his own gear.

All the operations of loading are performed on the emplacement floor. Shell, stored on sabots under the front parapet, are picked up by a barrow and wheeled up to the carrier (A), into which they are tipped. The carrier is counterbalanced so that one man working the winch handle (B) raises it with the projectile till it bears up against the breech of the gun elevated to 15°. The projectile is then rammed off the carrier, which contains a loading tray on rollers, entering the breech and held by a catch until the charge also has been rammed. The catch is then released and the tray drops back into the carrier, which is immediately lowered. The projectile is thus never lifted by tackle or sling, and one man easily takes it on to the barrow and tips it into the carrier, which can be elevated till a paul engages a notch, which detains it in a position allowing the gun to recoil and the breech-block to be swung clear. A short further lift to a second notch brings the carrier into the loading position. As soon as the gun is sufficiently elevated, the opening of the breech begins and is completed by the time the gun comes to rest. Similarly the closing of the breech is effected as the gun is being depressed. There is thus no loss of time, and with untrained labourers the gun can be elevated, loaded, depressed to firing position and trained 60° in 50 seconds. At the same time, all numbers are well protected and only the laying number is raised above the emplacement level.

There are two carriage sights, that on the left side being automatic with a telescope, replaceable by an ordinary V. In addition, there are two sets of gun sights which can be used from the sighting platforms if desired. The advantages of being able to fire with the eye to the sight appear so great that, I believe, gun sights will soon be things of the past.

The first mounting of the above design is nearly completed and several rounds have been fired from it. It is always dangerous to prophecy, and we naturally tend to exaggerate the capabilities of our children; but I shall be disappointed if a round a minute cannot be fired without difficulty by trained men from this mounting. The

[1] This racer path will now serve for the 6-in. H.P. service pattern and new pattern, the 9-in H.A. mounting; the 9·2-in. barbette (Mark III. and Mark IV.)

comparative figures in Plate V. show clearly that the new pattern is far simpler and less ponderous than its immediate predecessor, notwithstanding the fact that the gun is much more powerful.

IV.—*9·2-in B.L. barbette depression, Mark IV.* (Plate VI.).

The demand for a mounting to give 20° depression, provided an opportunity for the proposal of an axial recoil arrangement. The gun trunnions are placed in cast-steel sliding pieces, which move in a cast-steel cradle built up in four parts—two side and two end pieces, the latter being underneath the gun and furnishing attachments for the air cylinder (A) and the piston rod head (B) respectively. A sleeve (C), formed in two pieces, embraces the gun and furnishes a lug (D) below. The buffer cylinder (E) is held by this lug and its rear end enters the air cylinder (A) through a liquid gland at F.

The gun in recoiling drives back the buffer cylinder, which, acting like a ram in the air cylinder (A), compresses the air to about 500 lb. per sq. inch. The gun is brought up in 3 ft. 6 in. by the buffer, and the air pressure in the cylinder immediately runs it out again subject to control by a rod attached to the end of the buffer cylinder which, enters a hollow in the piston rod. An intensifier in connection with the air cylinder keeps the liquid gland in pressure which increases during the recoil. The general principle of this recoil arrangement was applied by my predecessor to a 10-in. H.P. converted mounting at Sheerness, where it has acted well. The pressure in the air cylinder with gun run out will be 200 lbs., which should be easily retained and can in any case be quickly restored. By means of a small hand pump attached to the cylinder (A) two men can easily restore lost pressure at the rate of 1 lb. per minute. There is free access to the gland by getting inside the cast-iron pedestal. It will be noticed that there are no valves or complications, and that, in addition to the care of the ordinary buffer gland, it is required only to make a packing to retain a working pressure of 200 lb. I believe that this is well within the powers of the Garrison Artillery of the present day.

The pedestal and roller path are the same as those of the 9·2-in. barbette mounting previously described; but, in this case, the emplacement floor is at the level of the top of the pedestal.

Training and elevating can be performed from the sighting platform (H) or from the emplacement level. There are three training stations and two elevating stations. A training arc and an elevation indicator are provided.

Sighting offers no difficulties in the case of an axial-recoil mounting and an auto-sight with telescope will be provided on the right side of the gun. For loading, the projectile can be brought up in a lift from which it can be rammed direct into the gun at 10° elevation, a sliding tray being provided as applied to the Mark III. barbette. The charges brought up in shelves under the projectile can be easily handled. As the gun can be trained 90° in 1′ 45″ by two men without any great effort, there is no objection to having alternative lifts, the corresponding position of the gun in training and elevation being

marked on the arc and indicator respectively. The gun can then be brought into either loading position by the training and elevating numbers working at the same time. I consider that a round a minute ought to be attainable.

Comparing this design with that of Mark II. (Plate V.), I think it will be admitted that, in dealing with such a gun as the Mark IX. 9·2-in., the minimum of size and the maximum of handiness have almost been attained. If this mounting proves successful, it will, I believe, become typical, thus superseding the earlier (Mark III.) design above described.

V.—*6-in. H.P. experimental* (Plate VII.).

The principal drawbacks to the service H.P. mountings arise from two causes, the high air pressure and the rocking ram cylinders. To hold a pressure of 1250 lb. requires special skill in care and packing; at the same time, the rocking cylinder is eminently unfavourable to the gland. It was necessary, therefore, to seek some other mechanical arrangement, and to lower the working pressure.

Plate VII. shows such an arrangement. The head of the ram (A) is trunnioned into links (B C) forming with B E and C D a three-bar system, giving practically rectilinear motion. The action on recoil will be evident from the figure. The ram descends vertically, displacing its own volume and reducing the air space (F F).[1] The pressure gun down is 250 lb., falling to 170 lb. when the gun is in the firing position.

An arc (H), attached to the elevator, moves a ratchet-wheel in connection with a friction clutch. The gun is thus held down after recoil and freed by releasing the clutch. There are, therefore, no valves of any kind, and the only part of the mounting requiring special attention is the packing of the gland (J), which has to retain a maximum pressure, gun up, of 170 lb. Perfectly free access to the gland is provided from the well (W), and I do not think that any difficulty will be experienced in keeping this mounting in working order. Both ram and cylinder are made of metal with a view to avoid the deposit of brown mud which collects in the service steel cylinders.

The Q.F. gun having no trunnions, is placed in a cradle (L) attached to the lug.

A carriage sight, built up from the brackets, is provided on each side, and the sighting platforms (K) have elevating and training gear in addition to that worked from the emplacement floor. Further provision is made for the employment of straight-edge sights attached to the gun cradle. Thus there are altogether four sights and by means of a special indicator elevation can be given from the emplacement floor. The gun can be laid when down from either sighting platform, and corrected immediately on rising by the laying number, who has complete control, and can fire with his eye along the sight.

The shield, of little practical use and very objectionable in

[1] Viewed as an H.P. arrangement, this is similar in principle to the 5-in. Indian pattern mounting and an experimental 6-in. proposed by my predecessor. Both have worked well.

hot climates, is omitted. A ratchet-lever arrangement, actuating the holding down gear, enables the gun to be worked down at drill.

The 6-in. Q.F. gun on board ship can fire five to six aimed rounds per minute. So far as loading is concerned, the conditions are precisely the same in this mounting. There is, however, the loss of time (about eight seconds) due to the raising of the gun, and the traversing, though extremely easy, will not be quite so rapid as in a naval mounting. Two rounds per minute does not appear to be too sanguine an estimate of the possible speed of fire, provided that the garrison gunner is not handicapped by an all-round pit, which can rarely if ever be necessary, or by complicated tactical arrangements from which the sailor is happily free. The only difficulty to be anticipated arises from the low energy of recoil due to cordite, which complicates the problem of an H.P. design. With the B.L. gun firing powder, it would be easy to ensure full recoil.

* * * * *

It will, I think, be clear from the above that the question of mounting guns for coast defence is not standing still, and that effort, in the exact direction demanded by General Richardson, is in full progress. Perfection is not easily attained, and the R.C.D. can but strive, according to its lights, to meet the complex requirements of coast artillery. To bring into full harmony the many conditions essential to rapid fire, is no easy task, since they involve many individuals who have different ideas and who are not, and perhaps cannot be, in close touch. Compromise is necessary and the compromise arrived at is not always the best possible.

One of the most important points is tactical simplicity, which in late years seems to have been too much neglected. The promiscuous application of the admirable system of position-finding, in circumstances to which it is not the least suited, has tended to lower the speed of fire and to introduce complications and possibilities of confusion which, in action, would have serious results. I have elsewhere[1] sought to define the legitimate sphere of the P.F. system and to plead for its restriction within due limits. To a single fort no less than 23 instruments have been allotted and if it were attempted to fight the guns by their means, mistakes and inordinate delays would certainly occur. We cannot fairly compare the rate of fire on board ship and in a coast battery, unless the conditions are the same, and if the seaman gunner were as heavily handicapped as his rival on shore, the figures which General Richardson gives would require much modification. In artillery fire, as in all other human affairs, centralisation is fatal to effective procedure, and the best results will be attained where the individual gun or the group works independently, subject only to general directions. For all practical purposes, good gun-layers are infinitely more valuable than expert P.F. manipulators.

From the point of view of decentralisation, it is clear that the pro-

[1] "*Adjuncts of defence*," "Proceedings," R.A. Institution.

vision of an auto-sight is of the greatest importance. Working by range-finder involves the following operations :—

1.—Laying of telescope.
2.—Reading of range.
3.—Transmission of range to gun.
4.—Putting elevation on sight.
5.—Laying gun.

There are thus practically five possible sources of error, any one of which may suffice to throw away a round.[1] In deliberate peace practice, these errors may rarely occur; but, at a time of excitement it is highly probable that some of them will supervene. An auto-sight eliminates four of these sources of error, and must materially improve the speed of fire. The gun-layer replaces the R.F. operator and, subject to due correction for "error of the day," a single operation accurately performed suffices. This is only one aspect of the question. In the case of a target moving at speed, these successive operations evidently cannot be performed, and the auto-sight stands above all possible competition. The full value of the auto-sight, when used against a moving target, can, however, only be obtained on three conditions, viz. :—

(*a.*) The gun-layer must be enabled to control the gun, or, in other words, to do his own fine laying.
(*b.*) The gun-layer should be able to fire with his eye along the line of sight.
(*c.*) It should be possible to use a telescope.

These conditions can be satisfactorily fulfilled only by a non-recoiling sight. Early in January 1896, therefore, I proposed a carriage auto-sight, which I have since fully worked out for 9·2-in. B.L., and for 6-in., 4·7-in., 12-pr. and 6-pr. Q.F .guns. All these sights are under manufacture, and extensive trials have already been made with the 12-pr.[2] This auto-sight is either of simple or combined type. In the latter case, by a turn of a lever, the sight becomes the ordinary bar and drum arrangement. It is, therefore, possible to lay on the water-line of a ship with the auto-sight, unlatch and lay on the deck or tops, the proper elevation being automatically put on by the first operation. Means of correction for tide and for error of the day are provided, and in the case of the 4·7-in., 6-in. and 9·2-in. sights there is a telescope in addition to the V, so that either can be used at pleasure.

Prophecy is usually disastrous; but I may express the hope that this auto-sight will alike simplify and greatly accelerate the service of coast artillery. Much will, however, necessarily depend upon what may be termed policy. The idea of subjecting a large number of guns to the control of a single individual ensconced in a cell on a neighbouring hill-top possesses many theoretical attractions. In practice, the necessary

[1] In some P.F. installations the sources of error are even more numerous and in action misunderstandings and delay appear inevitable.

[2] The conditions at Shoeburyness—a height of 25 ft. obtained by building up a platform of timber which was far from rigid—were unfavourable; but up to 1100 yards the shooting was extremely good. On the other hand, the sight had the advantage of being used by an excellent gun-layer.

results would be delays, misunderstandings and great loss of fire effect. The true policy of coast artillery is simply to seek to obtain as many hits as possible in the shortest time, and when engaging ships in motion, the changes of conditions will be so exceedingly rapid that no single directing head can hope to follow them. The group commander alone will be able instantly to select the target which offers, for a fleeting moment, the best chances to his guns. To accustom him to depend upon a continuous stream of detailed instructions telegraphed from a distance, is dangerous. In action, if he is wise, he will certainly seize upon any opportunities that may present themselves. His training in peace ought not to be allowed to destroy his iniative and to blunt his sense of responsibility. The introduction of cordite combined with auto-sighting will enable the gun or the group to be the real fighting unit, and while old type ordnance may, in some cases, be advantageously directed from a distance, the modern ideal is decentralisation.

The mountings for coast artillery above described represent much care and thought. While I trust that the officers of the Royal Artillery will see in them signs of advance, I am fully aware that they are by no means perfect. Already improvements in detail have suggested themselves, and criticisms, from the point of view of the Garrison Gunner, will be cordially welcomed. The closer the touch between the user and the manufacturer, the less will be the chance of mistakes and the brighter the prospects of rapid and well-ordered progress.

July, 1897. G.S.C.

LAYING WITH A CLINOMETER.

BY

CAPTAIN E. E. NORRIS, R. A.

A series of very interesting papers have appeared during the past year on this and kindred subjects. Major Keir wrote in April, 1896, Capt. Crampton discussed Clinometers in October, and Capt. Guinness took the other side in February, and advocated the direct method of laying.

No one however has touched on a weak point which seems very serious, unless met in some such manner as I shall propose later. The drill book touches it, on page 95, as follows:—"It is desirable to have the guns of a battery as nearly as possible on the same level. (That is when laying with the Clinometer). If this is impossible, the battery commander should order the necessary correction, which should be given by sections." But how many commanders have grasped the force of this short paragraph, and how many could say off hand what the "necessary correction" is?. With this point I wish to deal, first by showing that often corrections *would* be very necessary, and next, what they should be in various cases. The consideration seldom arises on a flat barrack square, but how often could we hope to have on service, both an horizontal position and an horizontal target?. Seldom, I think.

Throughout this paper, I mean by a target, an object 100 yards long, where the battery and target are in two parallel vertical planes. When speaking of the clinometer, I mean the spirit-level parallel to the gun, and its adjusting gear found on the last pattern Scott sight. Furthermore I assume that the fire is accurately distributed over the target.

Now let us consider a case. Range 2000 yards.

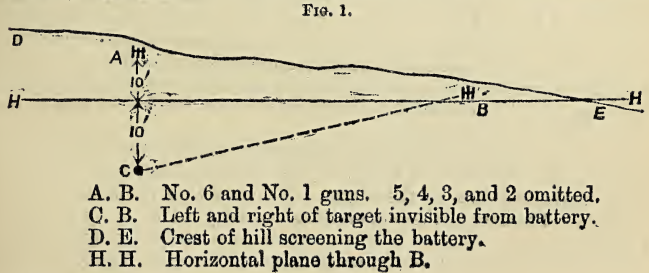
No. 1 gun and right of target in the same horizontal plane.

No. 6 gun, 10 feet above No. 1.

Left of target, 10 feet below the right of the target.

Seen from the rear of the battery, the view (ignoring perspective) would be like this:—

FIG. 1.



A. B. No. 6 and No. 1 guns. 5, 4, 3, and 2 omitted.
C. B. Left and right of target invisible from battery.
D. E. Crest of hill screening the battery.
H. H. Horizontal plane through B.

Now it is at once obvious, that if No. 1 gun is laid correctly with 2° 58′ elevation, and No. 6 gun is given the same elevation, the shell from No. 6 gun will pass 20 feet above the heads of the enemy at C. At 2000 yards, the slope of descent is 1 in 13. Therefore the shell from No. 6 would go 260 feet or 87 yards over the target. Similarly at 1500 yards No. 6 would shoot 133 yards over, and at 2500 yards; 60 yards over.

Let us follow for example the case when the battery commander omits to give the "necessary correction," and assume the true range to be 1550 yards.

Shot.	Gun.	Elevation.	Range.	Result.	Observation.
1st.	No. 1	1500	1500	—	Correct.
2nd.	,, 2	1600	1626	+	Correct.
3rd.	,, 3	1550	1603	+	Wrong.
4th.	,, 4	1525	1604	+	Wrong.
5th.	,, 5	,,	1630	+	Here no doubt, the B. C. would either doubt his senses, or abuse (mentally) his layers.
6th.	,, 6	1500	1633	+	
7th.	,, 1	1500	1500	—	Correct.
8th.	,, 2	,,	1526	—	
9th.	,, 3	,,	1553	*t*	

Here perhaps he would consider 1500 yards the correct range, and go on accordingly. If ever he found his fuze, which is doubtful, his right section would be firing low but still doing a little effect, his centre section a little over but with good effect, and his left section would shoot about 70 yards over the target with little or no effect.

Having demonstrated how "necessary" the "correction" is, let us see what it should be.

To return to fig. 1. We see No. 6 gun with the same elevation as that necessary for No. 1 would shoot 87 yards over the target. At 2000 yards five minutes depression reduces the range 38 yards, so the "necessary correction" would be about 11½ minutes, say 12. Similarly No. 5 gun would want $\frac{4}{5} \times 12$ minutes, or 10 nearly of depression. Now the difference between the average corrections necessary for the right and left sections respectively would be the same as between No. 1 and No. 5 guns. Therefore, if we take the correction for No. 5 gun as the correction for the left section, and half that for the centre, we shall get uniform shooting. Nos. 1, 3 and 5 will shoot a few yards short and Nos. 2, 4 and 6 a few yards beyond the target. These corrections would be given on the clinometer before ranging began. Nos. 1 and 2 would be set at zero, 3 and 4 at 5 minutes depression and 5 and 6 at 10 minutes. I only point out the corrections by sections, because the drill-book orders such (*see* quotation above), but it would be quite as simple to give corrections for each gun beforehand, and the table suggested below could be made up for that system as well as for the present regulation system.

But before a battery commander can order these corrections he must estimate the differences in height of his right and left guns, and also of the right and left of the target. He must then calculate the corrections. The first of these operations can only be done by eye after a good deal of practice. The second can be simplified by a table, which should form part of the range table for every field gun, if laying

by clinometer from under cover is ever to be recognised as a method to be frequently used.

Vertical height of one flank gun above a plane passing through the other flank gun and the target.	Depression to be given for each range.		
	1500 yards	2000 yards	and so on.
10 feet	6′	4′	etc.
20 feet	12′	10′	,,
And so on up to 100 feet	56′	46′	,,

N.B.—These would be the corrections for the high flank section, half such would be given for the centre section.

This table of corrections is only roughly calculated from the range table given on p. 34 of the hand-book for the 15-pr. B.L. gun, 1896; but, in conclusion, it may be useful to compare the result of using it with the practice at 1500 yards described above where no corrections were supposed to be given and which proved so ineffective and inaccurate.

Shot.	Gun.	Elevation.	Range.	Result.	Observation.
1st.	No. 1	1500	1500	—	Correct.
2nd.	,, 2	1600	1626	+	Correct.
3rd.	,, 3	1550	1547	✓	Correct.
4th.	,, 4	,,	1573	+	Probably not misleading.
5th.	,, 5	,,	1543	—	These would satisfy C. O.
6th.	,, 6	,,	1570	+	These would satisfy C. O.

and he would have every prospect of making good practice.

The prospect would be still better, if each gun had its own correction. The six shots would then give the following ranges:— 1500 yards; 1598 yards; 1547 yards; 1545 yards; 1543 yards; and 1542 yards, with the result, that the range would be found within four yards.

Say all this is not practical. Perhaps not; but, if the difficulty is not met, I fail to see how we are ever to rely on laying with clinometer from covered positions as a useful method. I wonder if those who advocate it have fully considered this difficulty.

FIGHTING BOOKS.

BY

CAPTAIN A. E. BUTCHER, R.A.

INTRODUCTION.

"Garrison Artillery Drill (1895)," Vol. I., p. 476, lays down :—"That each C.R.A. of a district, will, during peace time, elaborate in principle and detail a system for fighting his command."

The vital importance of the above paragraph can hardly be overrated, as the most usual form of attack to which a modern coast fortress (and more especially one protecting a channel which leads to an inner harbour) is liable, is that known as "running past" and, in resisting such a form of attack the fort will be called upon to engage ships moving at rates varying from 14 to 20 knots an hour, according to the facilities, or the reverse, offered by the channel to reasonably safe navigation.

Even taking the lower limit :—"The time from an enemy's ship being first sighted until its arrival within fire, will—even in day time—be less than half-an-hour; at night, far less. Supposing the hostile ships are a quarter of a mile apart they will arrive within a minute of each other. Each ship will, as a rule, be under the fire of each fort only 15 minutes at the outside." [a]

It would be quite impossible under such circumstances for a battery commander in the heat and excitement of action to give detailed orders as to projectiles, &c., for each particular class of ship at each particular range, and, in order to avoid dire confusion, such details must be worked out previously.

After an approaching hostile ship has been identified and her description passed to the G.G.C.'s, these officers should know, without any further instructions, the most suitable projectile with which to attack her at the various ranges, and the whole system of fighting the fort should proceed like clockwork with a minimum of orders.

Unless a regular system of fighting a fort has been worked out, down to the smallest detail, in time of peace, and unless such a system has been continually practised at drill, we may find ourselves placed in the humiliating position of seeing a hostile ship pass our fort practically unharmed.

[a] G.A.D. (1895), Vol. I., p. 488.

The "Garrison Artillery Drill," Vol. I., indicates the lines on which such systems of fighting forts are to be based, but, so far as I know, no complete specimen of a "Fighting Book" has yet been published.

I venture, therefore, to suggest the following form of "Fighting Book" as containing sufficient information in a concise form to enable a coast fort to be fought to the best advantage. In order to carry out the principle that when actually fighting his fort the B.C. should not be burdened with any matter not dealing directly with the best method of inflicting the greatest amount of damage, in the shortest possible space of time, on the hostile vessel opposed to him, the book has been divided into two parts.

Part I. contains a summary of useful information regarding the fighting powers of the fort. This part will necessarily vary considerably according to local circumstances, that given in the specimen book being only intended as a guide.

Part II. deals with the fort "in action." In this part it will be noticed that each form of attack—with its corresponding "detail of projectiles"—is dealt with on one double page, so that a B.C. has all his information before him at once.

Parts I. and II. should be bound together in the form of a book for easy reference.

With regard to Part I., it may be objected that the information contained therein should form part of the "Fort Record Book"[a]—and so it should—but by embodying it also in a "Fighting Book," which is being constantly consulted at drill, there is less likelihood of it being overlooked.

The only point in the "Fighting Book," which requires any special explanation here is the system of classification adopted for indicating the class of ship approaching the fort, as it may appear, at first sight, to differ from that contained in the drill-book. The divergence is, however, more from the letter than from the spirit of the authorized system, as the following will show.

All navies, from the point of view of a coast fort, naturally fall into the following five classes, viz.:—

I.—Heavy ironclads	Signal one.
II.—Medium ironclads...	Signal two.
III.—Light ironclads (including gun-boats)	Signal three.
IV.—Cruisers...	Signal four.
V.—Torpedo boats and light craft ...	Signal five.

Simplification for any individual fort can therefore be obtained by arranging locally the classes of ships noted in the identification sheets under the above-named groups according to the power of the guns with which the fort is armed in the following manner:—

(*a*) Ships carrying belt armour beyond the power of the heaviest guns mounted at ranges over 500 yards being classed as "Heavy."

[a] G.A.D. (1895), Vol. I., p. 452.

(*b*) Ships carrying belt armour beyond the power of the heaviest guns mounted at ranges over 2000 yards being classed as "Medium."

(*c*) All other ironclads (including gun-boats) being classed as "Light."

This classification for ironclads appears to be quite minute enough for all practical purposes, as all ships beyond the power of certain guns at the above ranges would have to be dealt with similarly by those guns—*e.g.*, Classes A, B, C, D, E, F, G, H,[a] being beyond the power of the 10″ B.L. above 500 yards would all have to be attacked by "secondary or shell attack" and can therefore all be, with advantage, classed as "heavy" for those forts whose most powerful gun is the 10″ B.L.

The numerical signals have been adopted to prevent confusion with those contained in the identification sheets and are, moreover, applicable to the ships of any nation.

In order to make the specimen "Fighting Book" more realistic, it is supposed to be made out for a fort mounting the following armament:—

A Group	2, 10″ B.L.
B „	2, 12·5″ R.M.L.
C „	2, 6″ B.L.
D „	2, 6 pr. Q.F. Hotchkiss
E „	2, 3 pr. Q.F. Hotchkiss
Moveable Armament ...	2, 40 pr. R.M.L. 3, 3 Bar. Nordenfeldt

and covering a narrow passage leading from the open sea to a sheltered harbour beyond. The fort is fought by D.R.F., no position finder being installed.

[a] Identification sheets.

MEMORANDUM.

The instructions contained in this book are, under *ordinary circumstances, to be rigidly adhered to;* it is, however, to be distinctly understood that, in exceptional cases, *Battery Commanders are expected to use their own judgment as to changing the nature of projectile,* when such a course is evidently indicated, reporting the fact of their having done so to the fire commander.

The system herein laid down is to be continually practised at drill, so as to insure all ranks to be thoroughly conversant with the method of fighting the fort.

(By order)

.....Captain R.A.,

Instructor in Gunnery,

.....Defences.

REFERENCES.

A.P. means *Armour Piercing Shot* (Steel or Palliser, according to the gun).

C.P. „ *Common Shell, Percussion fuze.*

S.T. „ *Shrapnel Shell, Time* „

S.P. „ *Salvo Points.*

FORT X.

BATTERY COMMANDER'S FIGHTING BOOK.

PART I.

ARMAMENT.

Description	Groups	Number and Nature	How Mounted	Remarks
Primary	A	2 10″ B.L., Mark II.	H.P. mounting	Fought by G.G.C.
	B	2 12·5″ R.M.L., Mark I.	En Barbette	
	C	2 6″ B.L., Mark IV.	H.P. mounting	
Secondary	D	2 6-pr. Hotchkiss	Cone mounting	
	E	2 3-pr. ,,	,,	
Moveable		2 40-pr. R.M.L.	Travelling carrriage	Have permanent emplacements on left flank.
		3 3-bar. Nordenfeldt	Parapet mounting.	

POWER OF GUNS.

Nature	Penetrat'n of W.I. in inches					Weight of		Remarks.
	M'zle	500	1000	2000	3000	Charge	Projectile	
						lbs.	lbs.	
10″ B.L., Mark II.	22·3	21·4	20·4	18·6	16·9	252 P[1] Brown	500	Common shell will penetrate about ⅓ of these thicknesses.
12·5″ R.M.L. ,, I.	17·4	16·7	16·0	14·7	13·5	165 P[1] Black	820	
6″ B.L. ,, IV.	12·4	11·4	10·5	8·9	7·5	48 E.X.E.	100	

Note I.—Against "Hard Armour," the guns will only penetrate $\frac{4}{5}$ of the above thicknesses.

Note II.—Perforation decreases as the shot strikes more or less obliquely and, against "Hard Armour," it has decreased 0·8 of the direct perforation before reaching 55° with the plate when it glances off; against W.I., the glancing angle is 45° when the perforation has decreased to 0·7 of its normal amount.

PRELIMINARY ARRANGEMENTS.[a]

I.—Receive reports that the groups are ready for action and that the group differences have been chalked on the gun drums, or crest-rings in the case of guns fitted with front pointers.[b]

II.—Ascertain that each G.G.C. is in possession of his "fighting card."[c]

III.—Test all means of communication and see all electric order dials (if used) are "at stops."

IV.—Settle whether tangent or quadrant elevation is to be used.

Note.—Quadrant elevation should always be used, if possible, in preference to tangent elevation, as, by so doing, "personal error" is eliminated and the service of the gun accelerated owing to the operations of elevating and training being carried out simultaneously.

BATTERY COMMANDER'S CORRECTIONS are :—

I.—For range—

(*a*) Tide (not necessary in case I.)
(*b*) Powder error, or error of the day.
(*c*) Travel of objective.

II.—For deflection—

(*a*) Wind.
(*b*) Point of impact.
(*c*) Travel of objective.

RULES FOR BATTERY COMMANDERS.

I.—No battery commander may select his own objective, but must direct his fire on that indicated to him by the fire commander.

II.—No battery commander may open fire until permitted to do so, with the whole or part of his armament, by the fire commander, except under exceptional circumstances, when he may do so on his own responsibility, reporting his reasons for so doing to his fire commander.

III.—A ship signalled by the fire commander as N.C. (not classed) is to be attacked at all fighting ranges with C.P. down to the water-line.

A ship signalled as U.K. (unknown) is to be attacked at all fighting ranges by C.P. Fire to be directed at her superstructure generally.

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[a] These may have to be amplified to meet local conditions; those given are common to all forts.

[b] In the case of mountings fitted with front pointers the system of chalking the differences on the gun drums will be found most inconvenient, as the gun captain will have to run round to the front every time he wishes to ascertain what the difference for any particular training is. The following method has been used with success :—Mark, with chalk, sections on the crest-ring corresponding to those on the gun drum, and, in these sections, chalk up the differences. Now, if a temporary pointer be fixed to the shield (H.P. mounting) vertically above the permanent pointer, the gun captain can read the differences without moving from his post in rear. Further, if the pointer be extended a few inches *above* the shield and the chalk marks also carried up to the upper crest-ring, the gun-layer can himself read the difference, even when laying the gun run up.

[c] For specimen form, see end of book.

Salvo Points.[a]

(*Applicable only to forts commanding a narrow channel.*)

I.—When a ship advances to within 1200 yards[b] of the first "salvo point" with the intention of "running past," the battery commander gives the signal: "Lay on salvo points"—viz., "Puts visual dials to zero" or "Electric dials to stops." On this signal, G.G.C.'s order their groups to be laid on "salvo points" as under[c]:—

(A) Group on points, Nos.....&.....

(B) Group on points, Nos.....&.....

(C) Group on points, Nos.....&.....

II.—After the dials have gone to zero for "salvo points," no notice[d] is to be taken of any subsequent range appearing on the dials until the ship has either passed the last point or is disabled, when the order to "concentrate"—*vide* III. below—will be given by the B.C.

III.—If a ship is disabled when passing "salvo points," the B.C. gives the signal "to concentrate" by raising a "blue flag" at his fighting station and blowing a whistle to attract attention. On this signal, all groups concentrate on the disabled ship at the *mean range* of the two "salvo points," between which she then is until the correct range appears on the B.C. dial.

IV.—After a ship has passed "salvo points," groups will continue firing independent group salvos until "cease fire" or "change of objective" is sounded.

V.—The ammunition for "salvo points" should be conspicuously painted and kept specially handy for loading, as, if it has to be carried any distance, some of the points will, assuredly, be missed.

VI.—When the signal "lay on salvo points" is given, any gun which is just about to fire at a known range should deliver its fire before training on to "salvo points."

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[a] These are imaginary points in mid-channel over which the ship must pass and whose range and training have been previously determined and painted on the gun-drums.—"G.A.D." (1895), Vol. I., p. 486.

[b] A ship steaming 14 knots will traverse this distance in just over two minutes.

[c] The combination of salvo points must be arranged locally.

[d] This is necessary to enable the B.C. to pick up the ship's range again as she passes the fort, so as to have same (with all necessary corrections) on the dials the moment the vessel has passed the last salvo point.

Signals.

The following are used to indicate an objective and its probable method of attack :—

Heavy ironclad	indicated by	ONE
Medium „	„	TWO
Light „ (including gun-boats)	„	THREE
Cruiser	„	FOUR
Torpedo boat and light craft	„	FIVE
Not classed	„	N.C.
Unknown	„	U.K.
Bombardment at long range	„	L.R.
„ medium	„ „	M.R.
Close action	„	C.R.
Running past	„	R.P.

[a]A range and bearing or Number of a square indicates the objective.

The following message from fire commander to battery commander exemplifies the above :—

X—Four—150—R.P.—commence firing; meaning:

Fort X, engage cruiser in square 150; she will probably run past; open fire as soon as possible with all your guns.

This would be passed on by the battery commander to his gun group commander in the following form:—

A—Four—4000—220—R.P.—commence firing; meaning:

A group, engage cruiser, whose range and training from me (B.C.) 4000 yards and 220°; she will probably run past; open fire as soon as possible.

Method of Attack by Ships.

Ships can attack this Fort in.....ways[b] :—

I.—By bombardment at long range ...	... Signal	L.R.
II.—By attack at medium range ...	... „	M.R.
III.—By close attack	... „	C.R.
IV.—By running past	... „	R.P.

Principal Methods by which Forts Attack Ships.

I.—By fire at the upper structures :—This has been termed "secondary attack," but, as it appears to be the best to adopt in the majority of cases and the most important one to consider, it may be better to term it the "shell attack."

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[a] Is the best method of indicating a fast-moving objective to the *guns* when the depression range finder is close to the groups.

[b] According to local circumstances.

II.—By fire at the belt and specially armoured or so-called "vital parts:—This has been termed the "primary attack" but it may be better to call it "attack of belt and primary parts" or, briefly "belt attack."[a]

NOTES FOR BATTERY COMMANDERS.

I.—The following trumpet and whistle sounds will be found useful:—

1 Blast on whistle	... meaning	shot.
2 Sharp blasts on whistle followed by 1 long blast	... "	miss fire, go on with next gun.
2 G's	"	change of objective.
3 G's[b]	"	salvo points.

II.—Each gun group commander should be provided with a small red banderole to be used as follows:—

(*a*) Red banderole to be stuck in the ground when the group is loaded.

(*b*) Red banderole to be lowered immediately the group has fired.

These flags should be placed so that they can be seen by the battery commander and are intended as an assistance to that officer in indicating what groups are loaded.

III.—In order to save as much time as possible, the following system for arriving at the "speed" and "deflection" correction is suggested:—

Battery commander	...	Speed.
Drum reader ...	...	Now * * * stop 2500 (any range).

The interval of time elapsing between the words "now," "stop" represents the time taken by the objective to alter its range by 50 yards, which time is taken by the battery commander in seconds with a stop watch.

The correction for speed is then at once ascertained by reference to the tables.

"Deflection" is found in a similar way.

IV.—To obviate the necessity of a battery commander writing his orders and making the calculations necessary for "speed," &c., corrections, it is suggested that he should have on his staff a quick, neat writer to do all this for him. His attention need not then be distracted from his own particular work—viz., observation of fire.

---

[a] *Vide* "General directions for the attack of ironclad-ships."

[b] In connection with visual signal to attract attentions and when former cannot be seen owing to smoke or any other reas' n.

V.—The following sequence and form of orders from a battery commander to his gun group commander when fighting a fort is suggested :—

A
IV.
183
R.P.
Salvo, Right to Left (or Left to Right)
Case I.

meaning :—

A group engage cruiser whose arc bearing is about 183° ; she will run past. Nature of fire group salvo from right to left. Tangent elevation.

After sending the above, the battery commander ascertained his corrections as follows :—

Battery commander to drum reader ...		"Speed."
Answer		"Now."
		"Stop."
		2400.
Battery commander to clerk...	...Powder	+ 50.
	Speed	−225.
	Tide	± 0.
	Impact	+ 60.
Clerk		−115.
B.C. to dial No. ...	...Range correction	−125.

Note.—The battery commander gives his corrections to the dial number in the nearest multiple of 25 to enable him to put it on the dial which only reads to 25 yards.

B.C. to drum reader ...	Range at	50 (or 100).
Drum reader...2300 ...	On dial	2175.
"Range"...	„	2125.
„ ...	„	2075.

And so on.

When the range appears on the dials, the battery commander sounds "commence firing."

VI.—The best form of attack against a ship approaching or lying nearly head on is "common shell above the belt."

VII.—The conning tower of an ironclad is generally a little before the funnel. This position, being vital to the manœuvring of the ship, is usually heavily armoured, but a shell bursting *under* it may destroy the communications and means of commanding the ship—to say nothing of the *personnel* of the staff. Failing this, the fire of even the lightest Q.F. guns may confine the staff inside the tower and greatly hamper the directing power of the ship.

VIII.—The tops of military masts form such difficult targets for direct attack that it is generally preferable to fire at the masts near the deck with C.P. from pieces of a suitable size. It is to be noted that the larger masts are used as ammunition hoists for the tops.

IX.—If, when a group is on any objective. "fresh objective" sounds, which fresh objective necessitates a change of projectile, the group should be, at once, trained on and fired at the old objective and then loaded with the projectile suitable for the attack of the new objective.

X.—The armour on turrets and barbettes does not, in many cases, extend down to the belt; consequently, there is a large vulnerable space open to the attack of common shell between the two.

PART II.

THE ACTION.

ATTACK NO. I.

AGAINST HEAVY IRONCLADS.—SIGNAL—ONE.

General Description.

These ships are heavily armoured, their "vitals" being protected by steel or compound—belt varying from [a] 17·2 to 21½ inches in thickness (equivalent to from 21·5 to 28 inches W.I.), and carrying their heavy guns in barbettes and turrets, armoured with from 12 to 18 inches of compound armour (equivalent to from 15·5 to 22·5 inches W.I.). With the exception of the belts and barbettes, the whole of the hull of vessels of this class is open to "shell attack."

General Idea for Attack.

The unarmoured portions and superstructure of these ships should be the principal object of attack.

When the ship's guns are mounted in barbettes, a common shell entering just below the barbette will probably meet with little or no resistance and may jamb the turn-table and so put the gun out of action.

The Q.F. and moveable armament should be employed to keep down the fire from the tops.

Quick fire direct into the mouths of the heavy gun shields would probably be effective.

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[a] Fort X. being armed with one group of 10″ B.L., the lower limit of armour constituting a 'heavy" ironclad is arbitrarily fixed—*vide* Introduction to this paper.

DETAIL OF PROJECTILES.

Group	Range—in yards	Projectile	Object of fire
	5000 to 1200	C.P.	Unarmoured portions and superstructure.
	1200	C.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After the ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	4000 to 1200	C.P.	At unarmoured portions and superstructure.
	1200	C.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After the ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	All ranges above 1200	C.P.	Unarmoured portions and superstructure below conning tower.
	At 1200	C.P.	Stand by for the signal "Lay on S.P." At this signal lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After the ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	2000 to 1000	C.P.	Direct into the mouths of heavy gun shields.
	Below 1000	C.P.	Conning Tower.
	2000 to 1000	C.P.	At tops to keep down fire therefrom.
	Below 1000	C.P.	Conning tower.
Mov ble armament 40-Pr. R.M.L.	Below 1000	C.P.	At base of masts carrying tops to destroy ammunition hoists thereto.

ATTACK NO. II.

AGAINST MEDIUM IRONCLADS.—SIGNAL—TWO.

General Description.

Ships of this class are generally fairly heavily armoured, their belt armour being usually composed of steel or compound plates, varying from 14·8 to 17·2 inches in thickness (equivalent to from 18·5 to 21·5 inches W.I.) and carry their heavy guns in barbettes protected by compound armour, varying in thickness from 9·5 to 14 inches (equivalent to from 11·2 to 17·5 inches W.I.).

With the exception of the belt and barbettes, the remainder of the hull is open to "shell attack."

General Idea for Attack.

The unarmoured portions of these vessels should be the principal object of attack beyond 2000 yards.

At ranges below 2000 yards, the heavy B.L. guns may attack the armour.

The Q.F. and moveable armament being utilised to keep down the fire of the heavy guns and tops.

Detail of Projectiles.

Group	Range—in yards	Projectile	Object of fire
	5000 to 2000	C.P.	Unarmoured portions and superstructure.
	2000 to 1200	A.P.	At belt.
	At 1200	A.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After the ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	5000 to 2000	C.P.	At unarmoured portions and superstructure.
	2000 to 1200	A.P.	At heavy gun barbettes.
	At 1200	A.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After the ship has passed last S.P.	C.P.	Independent of group salvos at the steering gear.
	All ranges above 1200	C.P.	Unarmoured portions and superstructure below conning tower.
	At 1200	C.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After the ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	2000 to 1000	C.P.	Direct into the mouths of heavy gun shields.
	Below 1000	C.P.	Conning tower.
	2000 to 1000	C.P.	At tops to keep down fire therefrom.
	Below 1000	C.P.	Conning tower.
Moveable armament 40-Pr. R.M.L.	Below 1000	C.P.	At base of masts carrying tops to destroy ammunition hoists thereto.

ATTACK NO. III.

AGAINST LIGHT IRONCLADS.[a]—SIGNAL—THREE.

General Description.

This class includes all ironclads carrying from 6·5 to 14·8 inches of compound armour (equivalent to from 8 to 18·5 inches W.I.) on their belts. Their guns are usually carried in barbettes armoured with from 6 to 9 inches of W.I. The rest of the vessel is unarmoured, or very lightly armoured.

General Idea for Attack.

Above 2000 yards, the unarmoured portions should be the principal object of attack; below this range, the heavy guns may attack the armour.

The Q.F. and moveable armament being utilised to keep down the fire from the heavy guns and tops.

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[a] This class will include the larger cruisers, *e.g.* "The Rurik."

Detail of Projectiles.

Group	Range—in yards	Projectile	Object of fire
	5000 to 2000	C.P.	At unarmoured portions and superstructure.
	2000 to 1200	A.P.	At belt.
	At 1200	A.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire when the bow (or counter) of the ship crosses the line of sight.
	After ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	5000 to 2000	C.P.	At unarmoured portions and superstructure.
	2000 to 1200	A.P.	At heavy gun barbettes.
	At 1200	A.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire when the bow (or counter) of the ship crosses the line of sight.
	After ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	All ranges above 1200	C.P.	At unarmoured portions and superstructure below conning tower.
	At 1200	C.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire when the bow (or counter) of the ship crosses the line of sight.
	After ship has passed last S.P.	C.P.	Independent group salvos at the steering gear.
	2000 to 1000	C.P.	Direct into the mouths of the heavy gun shields.
	Below 1000	C.P.	Conning tower.
	2000 to 1000	C.P.	At tops to keep down fire therefrom.
	Below 1000	C.P.	Conning tower.
Moveable armament 40-Pr. R.M.L.	Below 1000	C.P.	At base of masts carrying tops to destroy ammunition hoists thereto.

ATTACK NO. IV.

AGAINST CRUISERS.—SIGNAL—FOUR.

General Description.

These vessels are divided into armoured and protected cruisers, the former having side armour from 4 to 5 inches in thickness and having their guns protected with about 7 inches of armour.

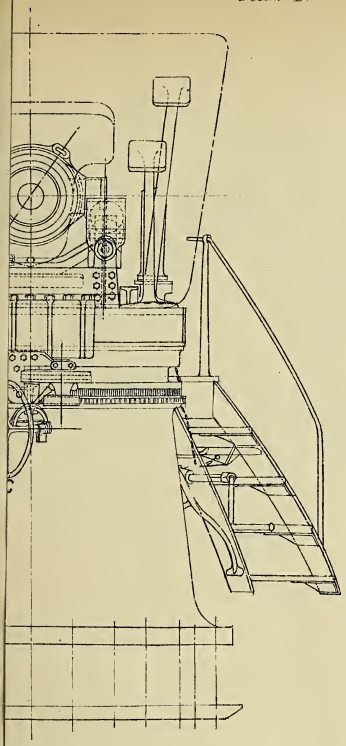
The protected cruisers have their sides protected by coffer dams and coal bunkers.

Their guns are unprotected.

General Idea for Attack.

As this class of ship will always try to run past forts at speed, every endeavour must be made to injure their hulls.

At all ranges, use C.P. at their "vitals" and superstructure, special attention being paid to the conning tower.



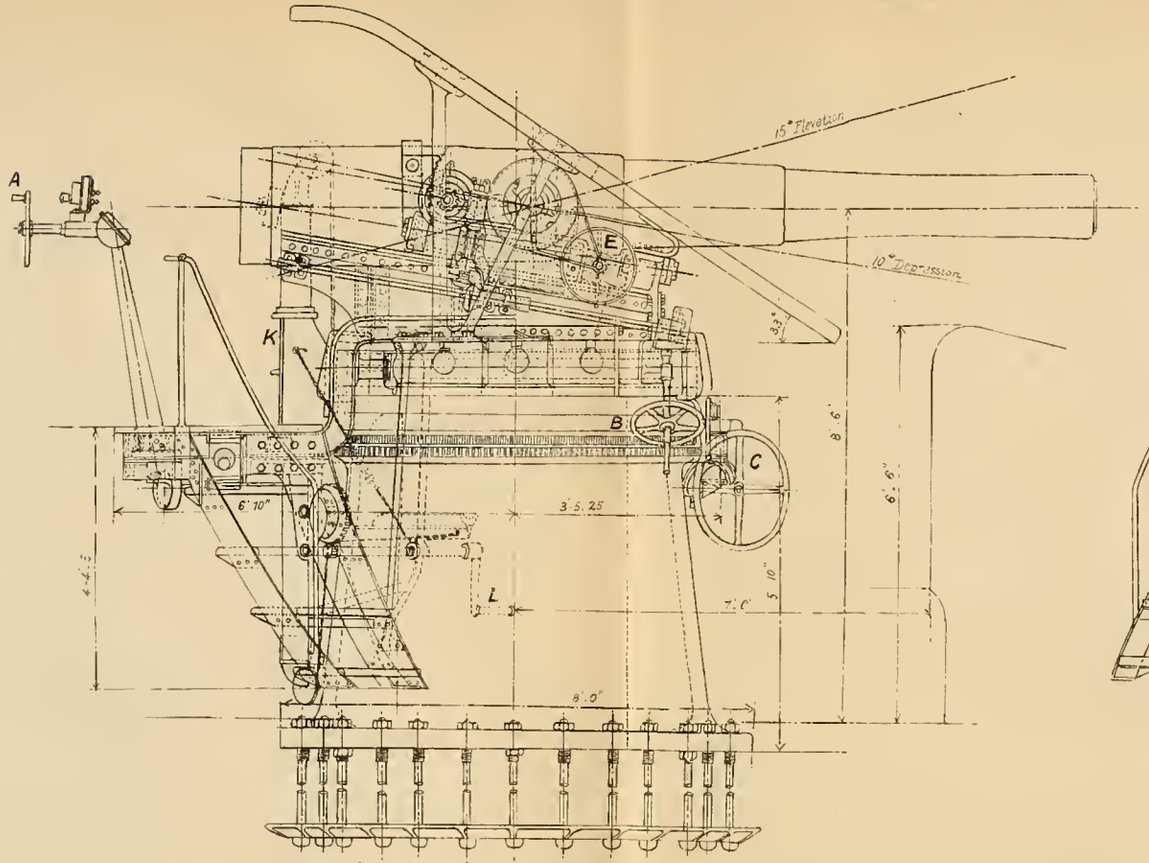
ELEVATION.

ine, by the Gun sights, by
the laying № standing on a
ming part of the emplacement.
wing platform - neither are
n also be laid, for use with
aining, by the wheels B. C.
is indicated at D. the range

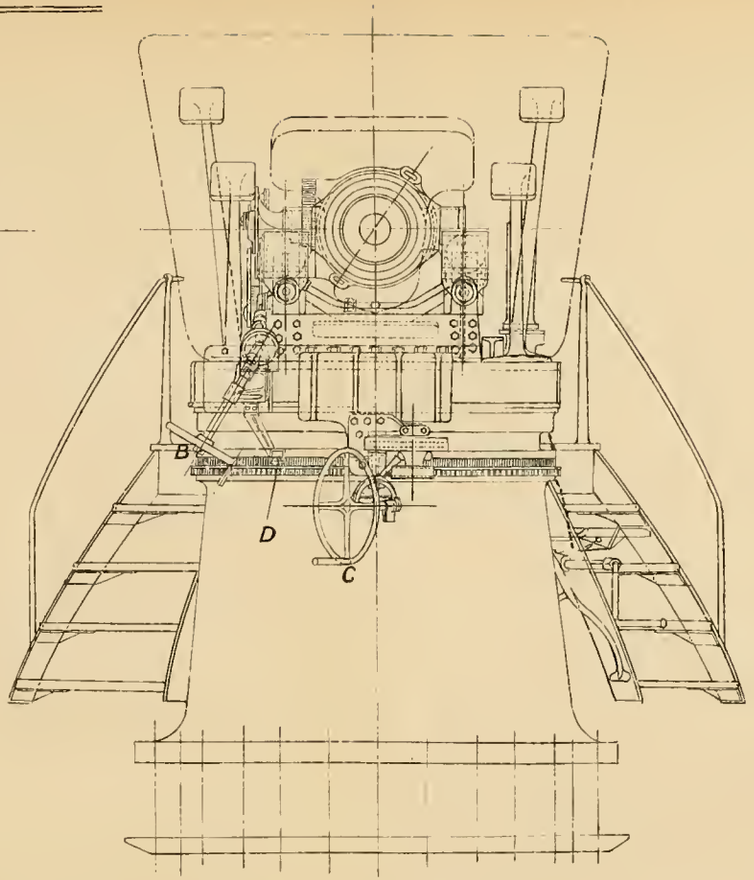
ALE.

4 5 6 7 8 9 FEET.

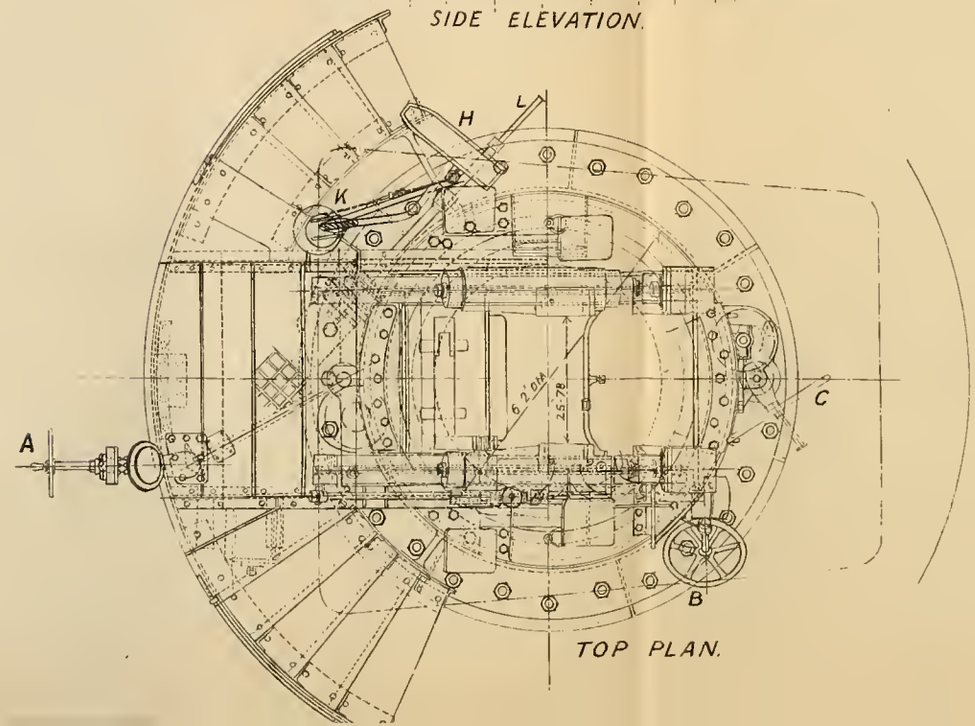
6 IN. B. L. GUN ON MARK II BARBETTE MOUNTING.



SIDE ELEVATION.



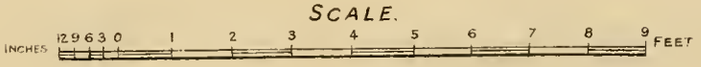
FRONT ELEVATION.

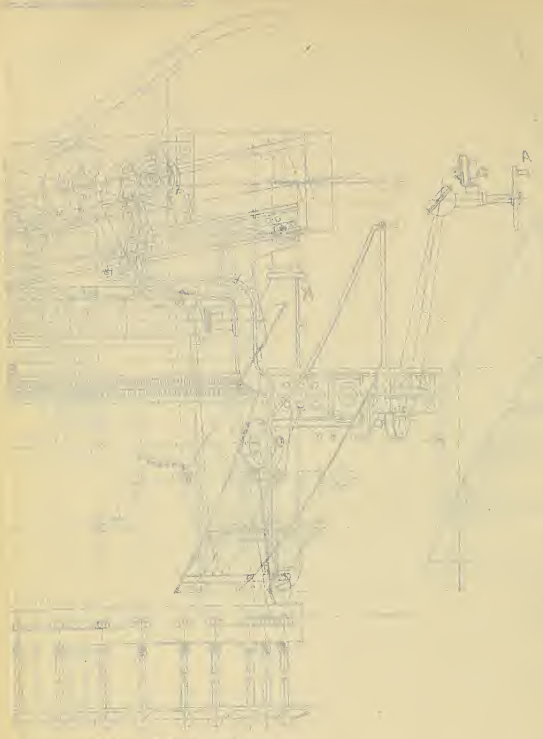


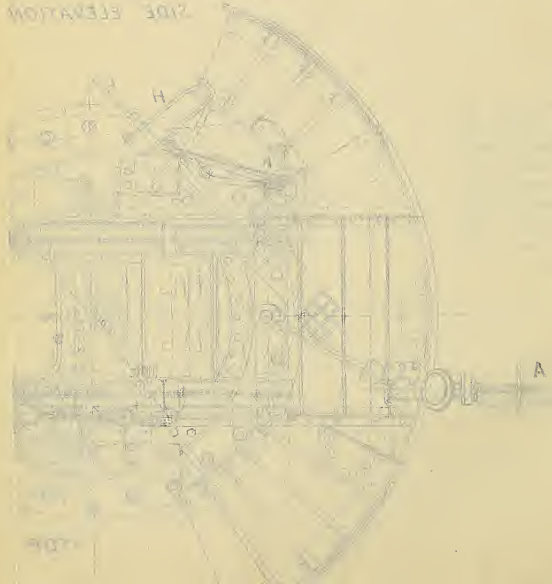
TOP PLAN.

The Gun can be laid for Line, by the Gun sights by use of the handwheel **A**, the laying N° standing on a fixed loading platform forming part of the emplacement, or on an extension of the moving platform- neither are here shewn. The gun can also be laid, for use with P F for elevation and training by the wheels **B. C.** The training of the gun is indicated at **D**, the range by a graduated disc **E**

SCALE.




A


H
A

INCH MK I.

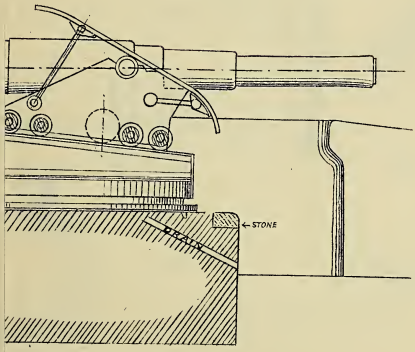


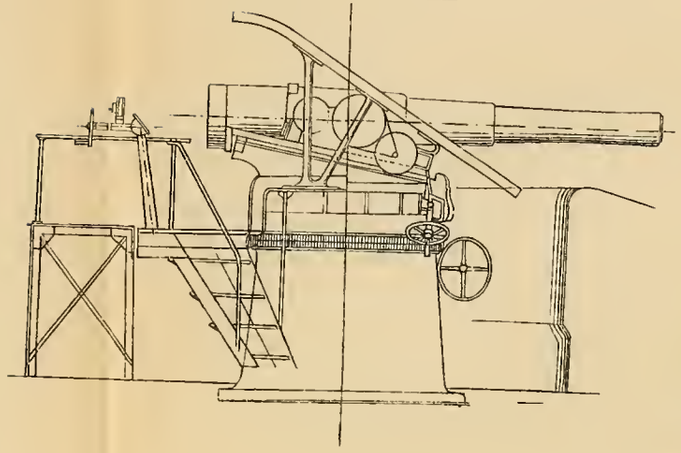
DIAGRAM
SHOWING
EVOLUTION OF 6 IN. MOUNTING.

SCALE.

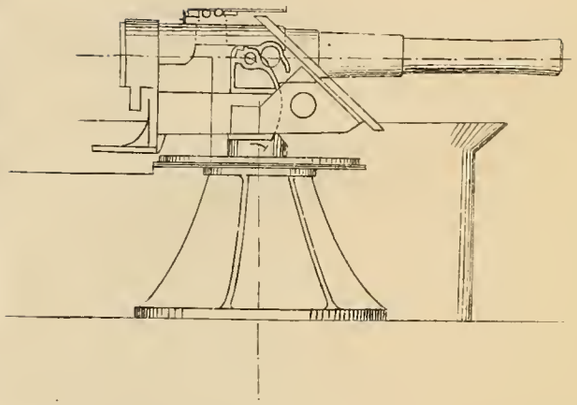
0 1 2 3 4 5 6 7 8 9 10 11 FEET

Plate II.

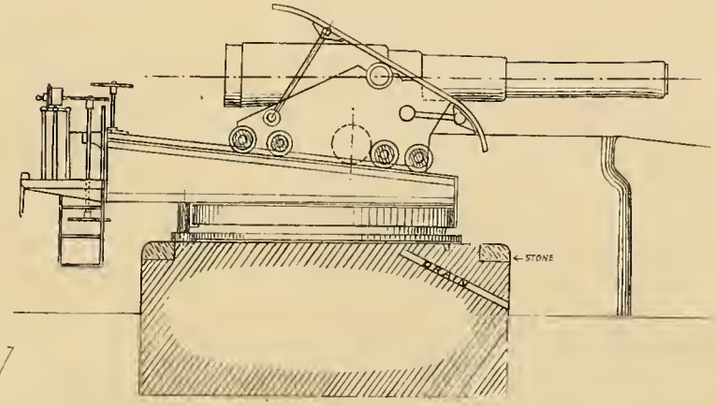
6 INCH MK. II.



6 INCH B.L. OR Q.L.



6 INCH MK I.



6 INCH Q.F. MARK II.

[N.B. The dotted line shows the outline of the Curved-fronted Shield]

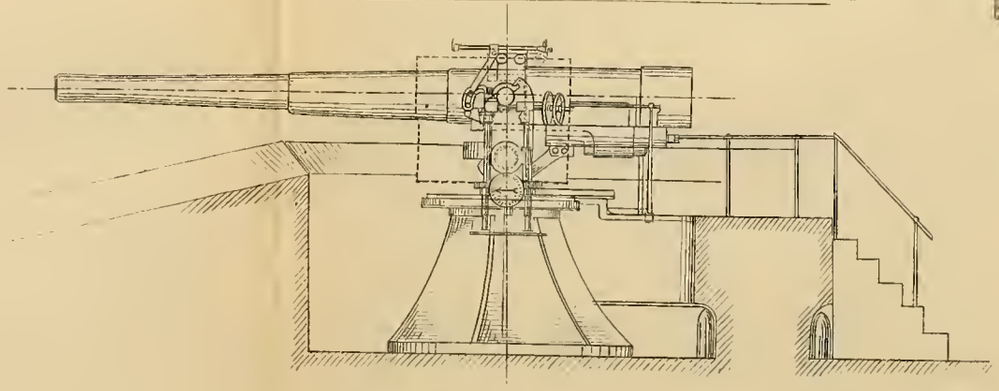


DIAGRAM
SHOWING
EVOLUTION OF 6 IN. MOUNTING

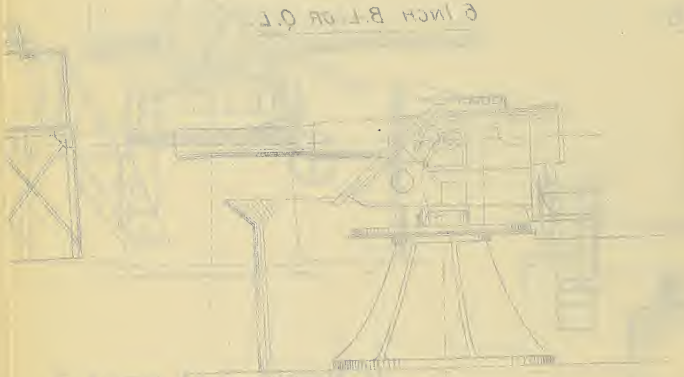
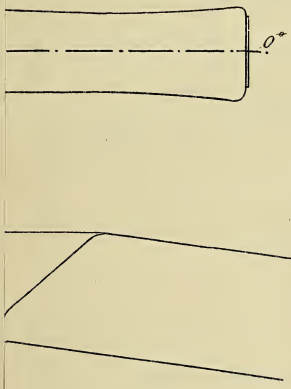
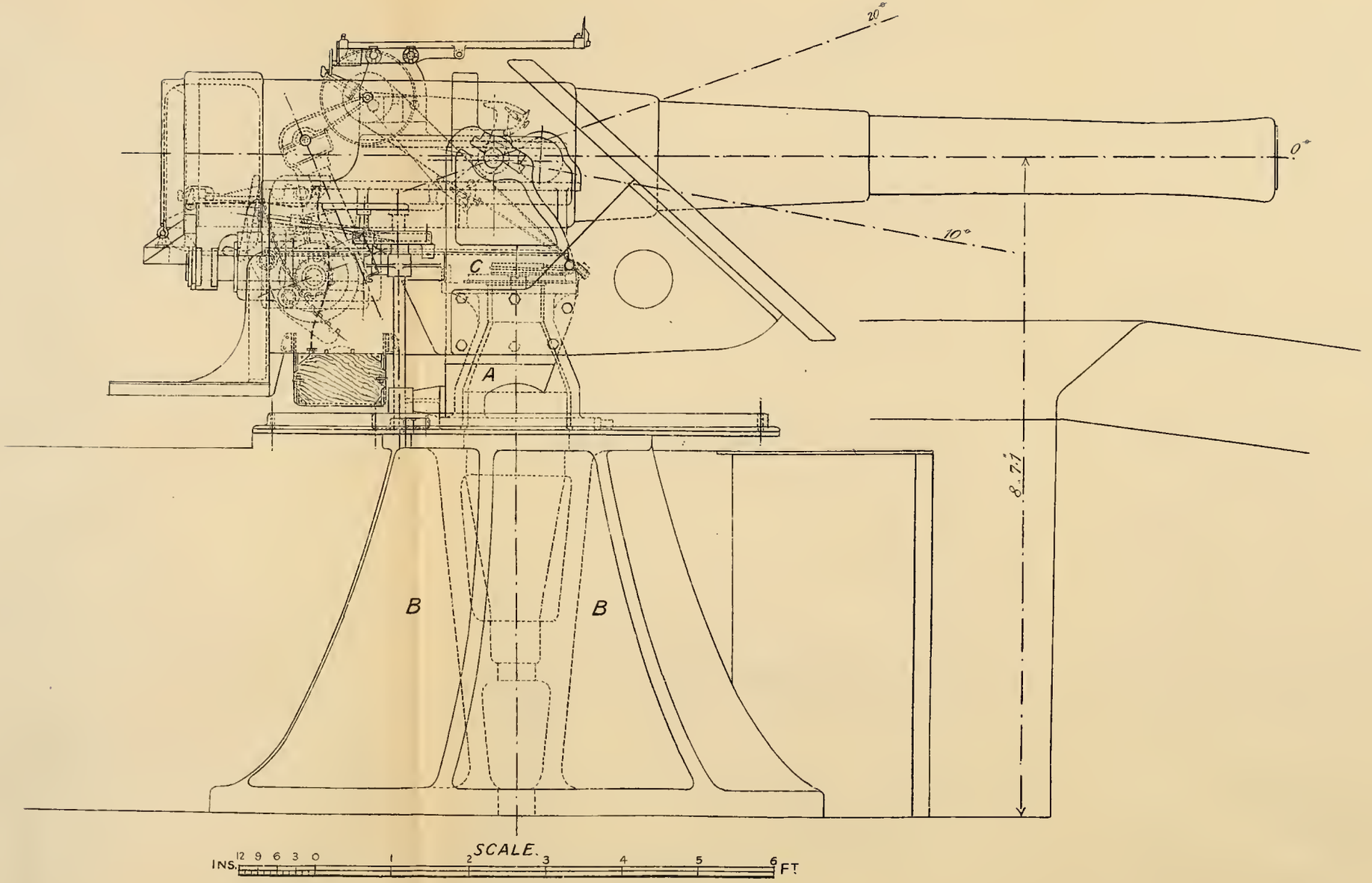


Plate III.



6-IN. B.L., B.L. & Q.F. OR Q.F. MOUNTING.



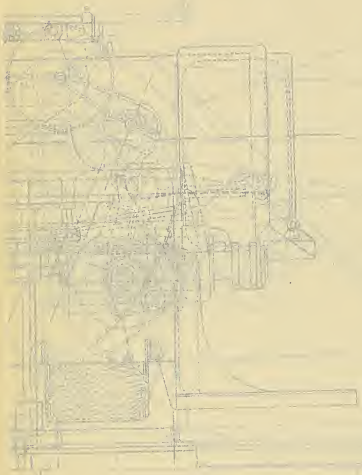
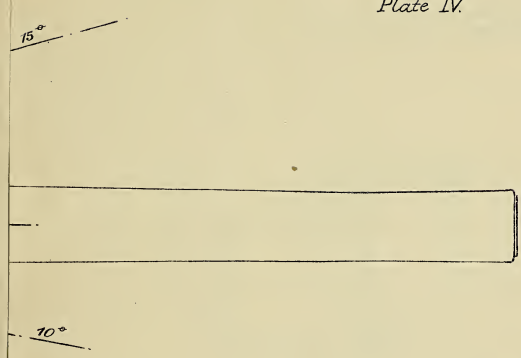
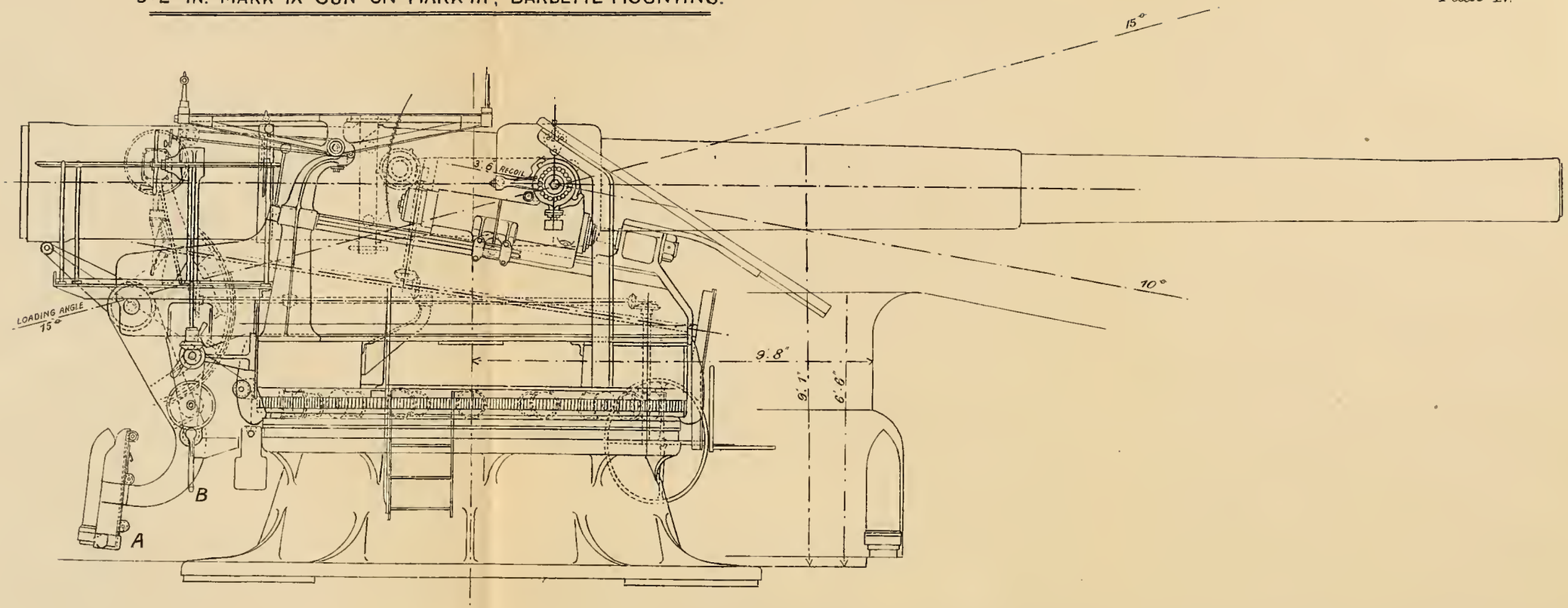


Plate IV.

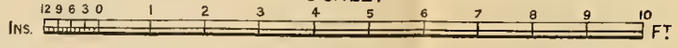


9·2-In. Mark IX Gun on Mark III, Barbette Mounting.

Plate IV.



SCALE.



9·2-IN. MARK IX GUN ON MARK III

SCALE.

Plate V.

9.2" Mk. II.

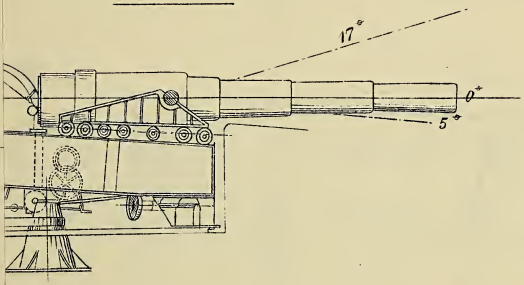
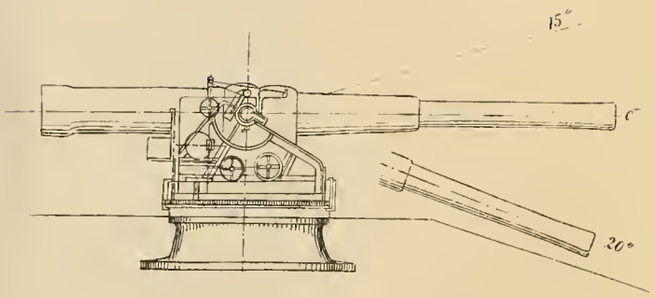
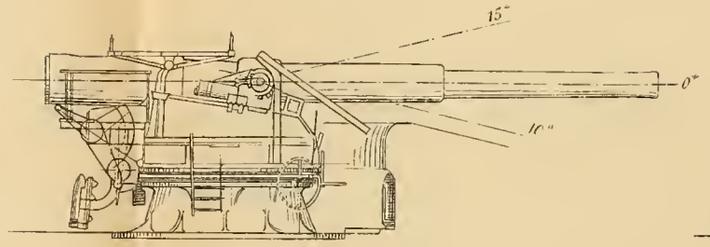


DIAGRAM
SHOWING
EVOLUTION OF 9·2 IN. MOUNTINGS.

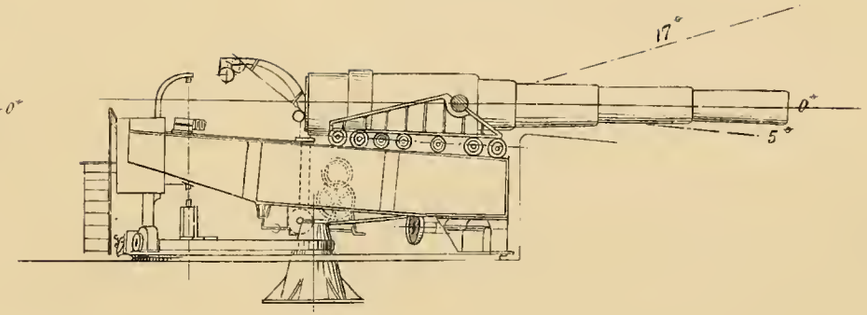
9·2" Mk IV.



9·2" Mk III.



9.2" Mk II.



SCALE.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 FEET

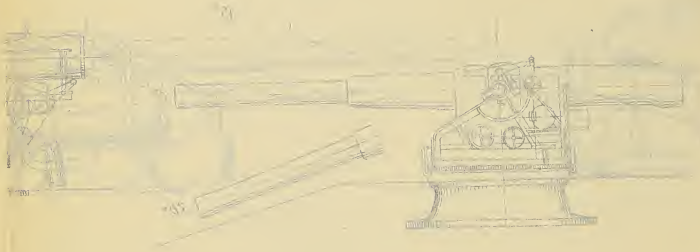
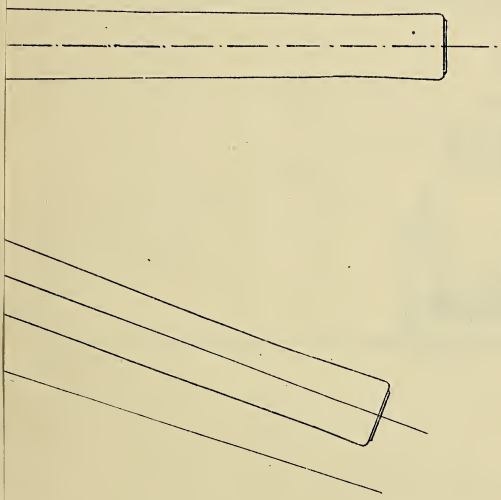
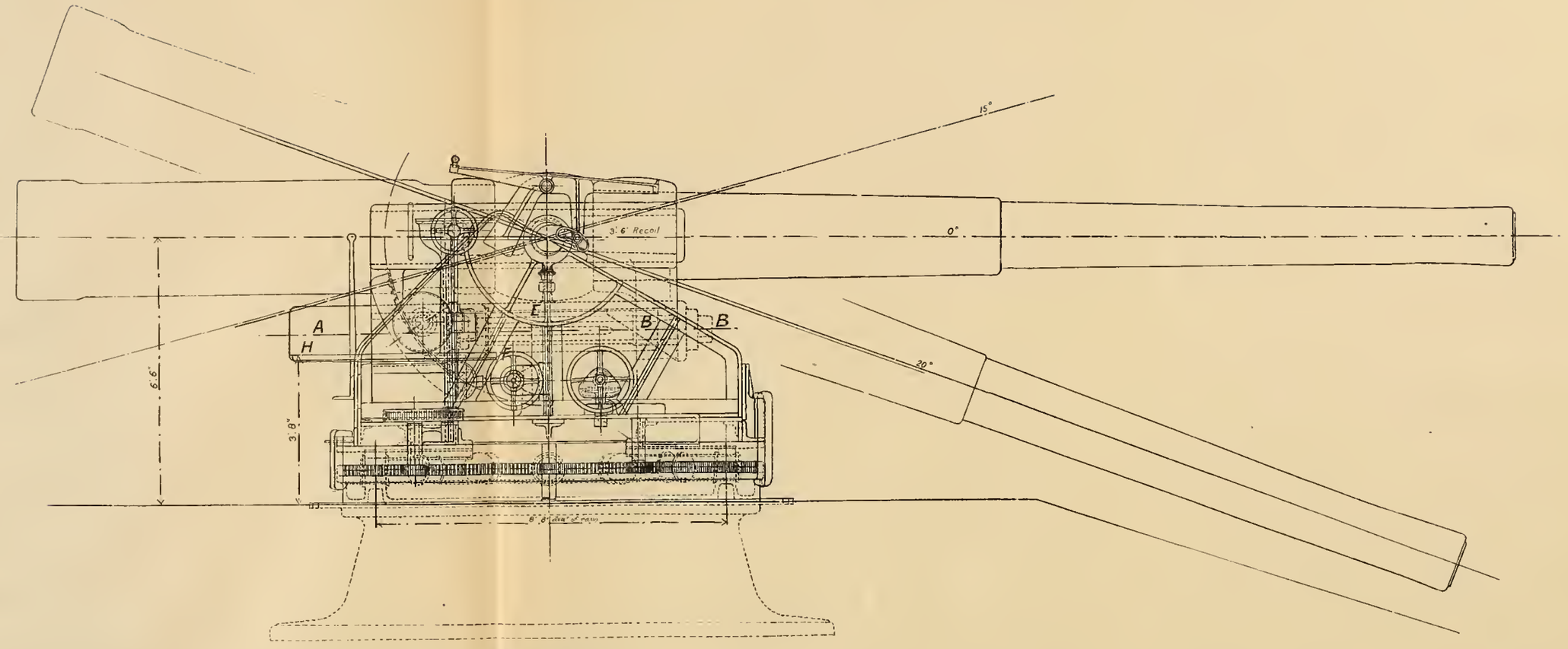


Plate VI.



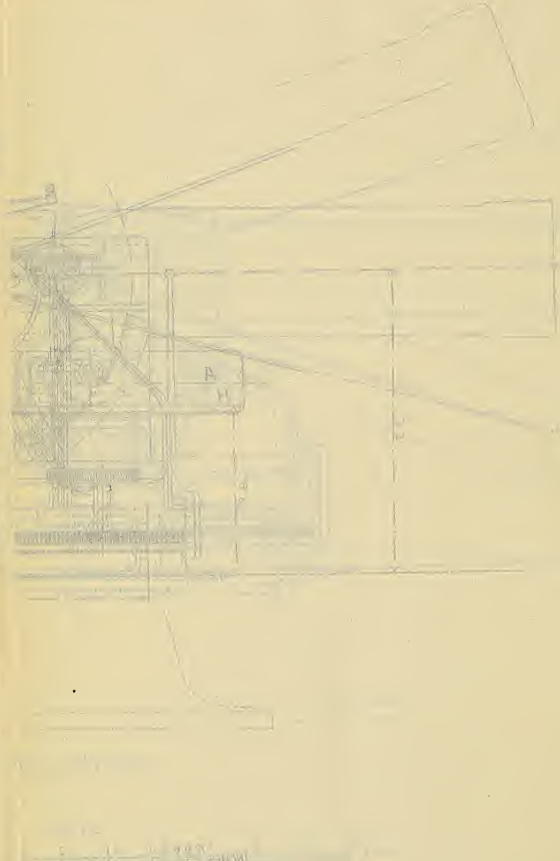
9·2 IN. MARK IV MOUNTING WITH MARK IX GUN.

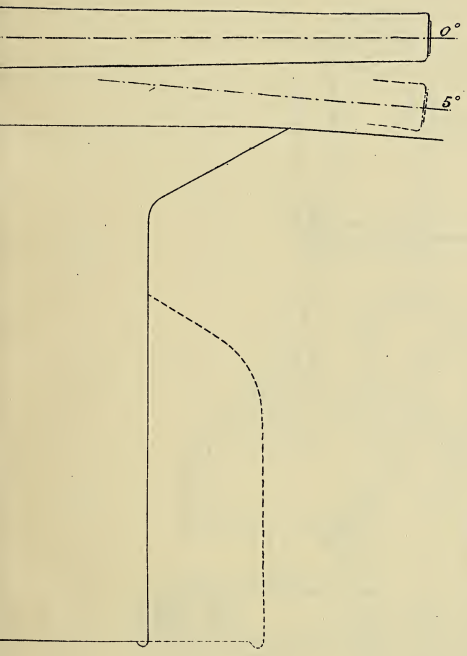


Side Elevation.

SCALE.

INCHES 12 9 6 3 0 1 2 3 4 5 6 7 8 9 10 FEET

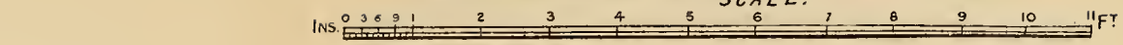


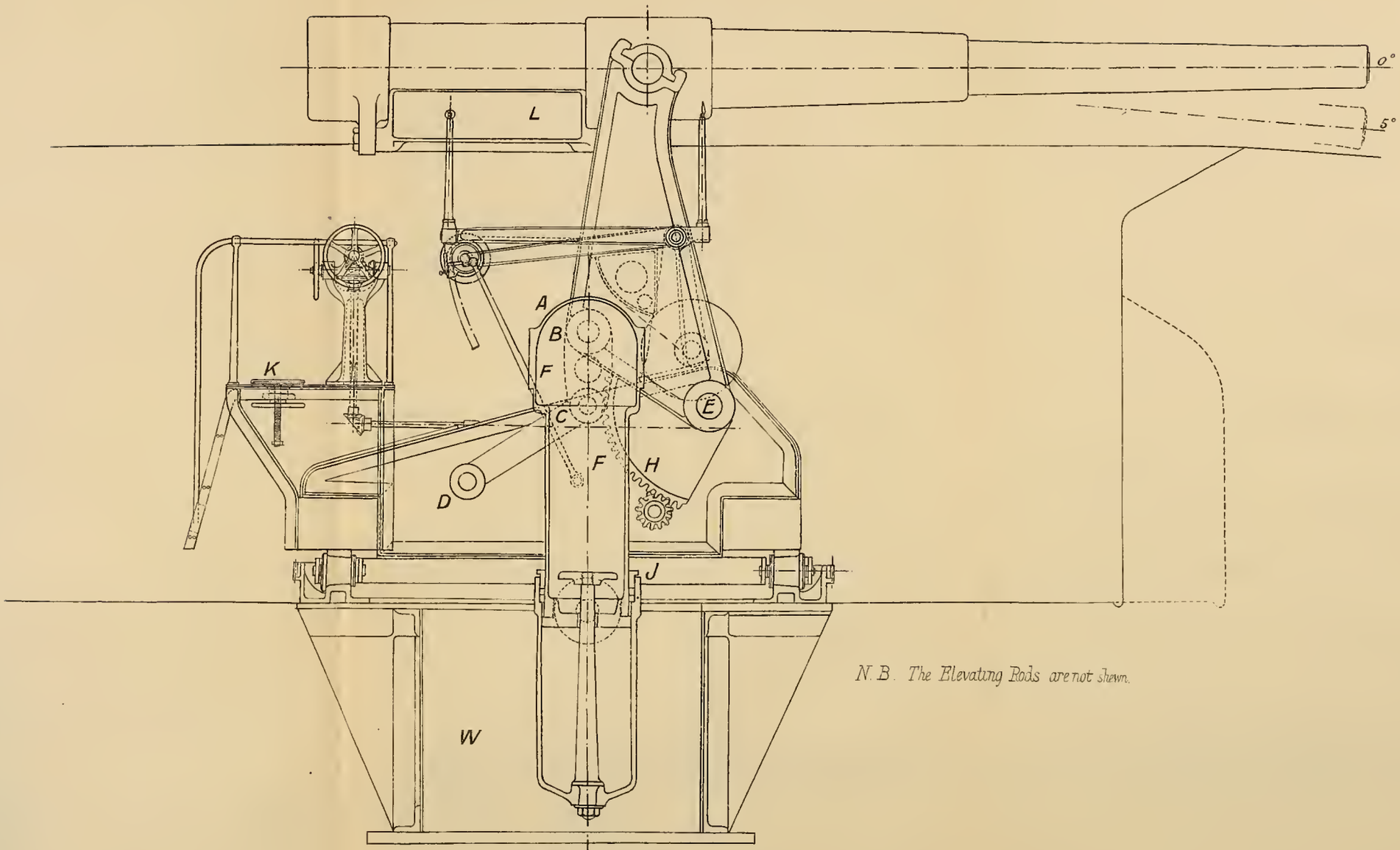


ng Rods are not shewn.

EXPERIMENTAL H.P. MOUNTING FOR 6-IN. Q.F. GUN.

SCALE.





N.B. The Elevating Rods are not shewn.

Sectional Elevation.

Detail of Projectiles.

Group	Range—in yards	Projectile	Object of fire
(A)	5000 to 1200	C.P.	At the hull, down to the water-line.
	At 1200	C.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After ship has pass'd last S.P.	C.P.	Independent group salvos at the steering gear.
(B)	5000 to 3000	C.P.	At the hull, down to the water-line.
	3000 to 1200	C.P.	Below the conning tower.
	At 1200	C.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After ship has pass'd last S.P.	C.P.	Independent group salvos at the steering gear.
(C)	5000 to 3000	C.P.	At superstructure.
	3000 to 1200	C.P.	At conning tower.
	At 1200	A.P.	Stand by for the signal "Lay on S.P." At this signal, lay on points Nos.....and.....and fire as the bow (or counter) of the ship crosses the line of sight.
	After ship has pass'd last S.P.	C.P.	Independent group salvos at the steering gear.
(D)	Below 3000	C.P.	At conning tower.
(E)	Below 3000	C.P.	At conning tower.
Moveable armament 40-Pr. R.M.L.	Below 2500	C.P.	Below the conning tower.

ATTACK NO. V.

AGAINST TORPEDO BOATS.—SIGNAL—FIVE.

General Description.

This class includes, besides torpedo boats proper, all small craft, such as launches, boats carrying landing parties, &c.

General Idea for Attack.

Q.F. guns are the weapons *par excellence* to repel this form of attack. Consequently, all guns of this nature should be utilised to the utmost extent.

With regard to the other natures of guns, *only those which, from their position, will not interfere with the Q.F. guns by obscuring the view with smoke, will be used.* The only projectiles from these guns which will be of any use against such a rapidly moving objective as a torpedo boat are those having a large cone of dispersion. Consequently, shrapnel shell and case shot should be exclusively used. The best burst for the former is 150 yards short.

Detail of Projectiles.

Group	Range—in yards	Projectile	Remarks
	[a]5000 to 1100 1100 to point blank	S.T. Case	Burst 150 yards short of objective.
	[a]5000 to 1100 1100 to point blank	S.T. Case	Burst 150 yards short.
	[a]4000 to 600 600 to point blank	S.T. Case	Burst 150 yards short.
	All ranges below 4000	C.P.	
	All ranges below 4000	C.P.	
Moveable armament 40-Pr. R.M.L.	All ranges below 3000	S.T.	Burst 100 yards short.

[a] By day only; at night, it is limited by the range of the electric light.

ATTACK NO. VI.

NIGHT ATTACK.

Before leaving the fort for the night, all the guns of the primary armament should be laid parallel across the channel, and loaded—*vide* "Detail of Projectiles.

Group (A) with elevation of ... ... 1°

„ (B) „ corresponding to $\frac{1100 \text{ yards for } \frac{B}{1}}{1400 \text{ yards for } \frac{B}{2}}$

„ (C) „ „ $\frac{1700 \text{ yards for } \frac{C}{1}}{2000 \text{ yards for } \frac{C}{2}}$

DETAIL OF PROJECTILES.

Group	Projectile	Remarks
(A)	Case shot	
(B)	S.T.	Fuzed for $\frac{1100 \text{ yards for } \frac{B}{1}}{1400 \text{ yards for } \frac{B}{2}}$
(C)	S.T.	Fuzed for $\frac{1700 \text{ yards for } \frac{C}{1}}{2000 \text{ yards for } \frac{C}{2}}$

Now, in the case of a torpedo attack during the night, the whole of the water area from 600 to 200 yards can be swept at a moment's notice with case and shrapnel bullets. The area for 600 yards from the bank must be defended by the 40-pounders of the moveable armament firing shrapnel or case assisted by the machine guns.

In addition, volleys of rifle fire from all the infantry allotted to the fort should be directed on any boats which may be visible.

Note.—In this form of attack, Q.F. guns act as described under Attack No. V.

In case of any other form of attack taking place during the night, the loaded guns should be immediately fired off and reloaded.

Group (A) with A.P.

„ (B) „ C.P.

„ (C) „ C.P.

and run on salvo points.

Group (A) on points Nos.....and.....in succession.

„ (B) on points Nos.....and.....in succession.

„ (C) on points Nos.....and.....in succession.

Note.—Any craft moving after dark is to be followed and ruthlessly sunk.

G.G.O.'s FIGHTING CARD—Front. (*Specimen Form.*)

(A) Group.

Class	Range—in yards	Projectile	Remarks
I	5000 to 1200 At 1200 After passing S.P.	C.P. C.P. C.P.	Aim at unarmoured portions. Prepare for salvo points. Nos.....and..... Independent group salvos at steering gear.
II	5000 to 2000 2000 to 1200 At 1200 After passing S.P.	C.P. A.P. A.P. C.P.	Aim at unarmoured portions and superstructure. Aim at belt Prepare for salvo points. Nos.....and..... Independent group salvos at steering gear.
III	5000 to 2000 2000 to 1200 At 1200 After passing S.P.	C.P. A.P. A.P. C.P.	Aim at unarmoured portions and superstructure. At belt. Prepare for salvo points. Nos.....and..... Independent group salvos at steering gear.
IV	5000 to 1200 At 1200 After passing S.P.	C.P. C.P. C.P.	Aim at hull down to the waterline. Prepare for salvo points. Nos.....and..... Independent group salvos at steering gear.
V	5000 to 1100 1100 to point blank	S.T. Case	Burst 150 yards short.

Reverse.

B.C.'s Signals.

Heavy Ironclad	I	Bombardment, Long Range	L.R.
Medium Ironclad	II	Bombardment, Medium Range	M.R.
Light Ironclad	III	Close Action...	C.R.
Cruiser	IV	Running Past	R.P.
Torpedo Boat	V	A bearing ... indicates Objective	
Not Classed	N.C.	Visual dials at zero or } " { Prepare	
Unknown	U.K.	electric dials at stops } " { for S.P.	

Sounds.

1 Blast on whistle ... ... means—Shot.
2 Short blasts on whistle followed by 1 long blast } " { Miss fire, go on with next gun.
2 G's ... ... " Change of objective.
3 G's ... ... " Salvo points.

G.G.O.'s Signals.

(i.) Red flag up when group is loaded.
(ii.) Red flag down when group has fired.

DEC 1 1897
U. S. PAT. OFF.

NOTES

ON

ARTILLERY DICTATED BY NAPOLEON AT ST. HELENA TO BARON GOURGAUD.

BY

F. E. B. L.

THESE notes, here given in their original form, have been communicated to the Revue d'Artillerie by Viscount de Grouchy who has drawn them from among his family papers.

It would be superfluous to insist on their historical interest.

Taken from dictation with a view to ultimate editing and publication, which however never came to pass, the notes are free from the adornments of style which usually characterize a work meant for the public, and indeed their extreme conciseness detracts somewhat from their clearness. Notwithstanding this the Director of the Revue has respectfully preserved the original form, for fear of altering the sense.

The unit of artillery is the division (*battery*): for horse artillery 6 guns; for field 8. The officers, N.C.O.'s and gunners of a company are sufficient for its service.

It would be better, were it not determined otherwise by the details of artillery, to form a unit of 4 guns, because a battery of 8 guns is already too numerous not to be often divided; but what forces the adoption of the larger unit is on account of artificers, spare stores, forges, &c. In taking a unit of 4 guns all that would be doubled; the extra expense involved would not be compensated by the advantage attaching to the 4-gun unit.

* * * * *

The 4 prs. and the 8 prs. have been rightly suppressed. Gribeanval simplified and experience has proved the necessity of further simplification. We have progressed in that direction. The 8 prs. and the 4 prs. were often employed in the wrong place: the ammunition of 8 prs. was expended where that of 4 prs. would have sufficed. It was a very considerable loss if transport is considered, it was 2 rounds instead of 1. Often there were only 4 prs. when 8 prs. were required. There is no line officer, nor even artillery officer, who can well grasp the

opportune moment and determine if 8 or 4 prs. should be employed, and even if he could, he is obliged to utilize what he has at hand. A single calibre is therefore sufficient for field work, then there can be no uncertainty.

The 12 pr. in either system remains in reserve to be employed with premeditation by general officers, either of the line or of the artillery.

The 6-in. howitzer is too wasteful: it consumes as much as a 24 pr. shot. They have rightly replaced it by a howitzer of 5 inches 6 lines; this slight difference of 6 lines gives a great advantage. The waggon holds 75 rounds, whilst that of the 6-in. only holds 50, and in supposing that the 5½-in. shell be inferior to the 6-in. the question comes to this: which would you rather have, one 6-in. howitzer or two 5½-in. ones. But the 5½-in. shell is already preferable to the 6-in. one. Gribeanval's carriage was altogether faulty. It has been altered, and rightly so, for there has been a gain of 100 per cent. in transport, and lightness given to both the carriage and the howitzer. But the latter still requires improvement: it should have a greater range, which might be obtained by lengthening it.

There should be two sorts of howitzers, one to combine with the 6 prs., the other with the 12 prs. The latter must have the inconvenience of greater weight, so as to obtain the greatest possible range from the form of the chamber, length, thickness of metal, &c. All these drawbacks are amply compensated in a reserve howitzer by the range being increased to the utmost. The field howitzers of the Boulogne Camp had that advantage.

It is equally necessary that the existing 12 prs. should have an increased range, not that changes in the gun are necessary, but in the carriage, which should admit of greater elevation being given to the gun.

Parks should also have 12 pr. grenades (see note C) which would weigh . . . . to be used with the 12 prs. Every waggon should contain some of these grenades in place of common shell.

This is contrary to Gribeanval's principle, which however is false. There are a thousand circumstances in war where it is requisite to open fire at a very long range, whether from one bank to the other of a wide river, or to hinder the enemy from encamping and occupying a position which can only be attacked from a distance. Finally it is a real disadvantage not to reply to an enemy's fire. We look however to artillery officers not to fire uselessly, for we pretend in no way to attack the fundamental principle that to open fire at a long range under ordinary circumstances is to burn ammunition and to destroy its effect.

Guns of higher calibre than 12 prs. are very useless. We have acted wisely in suppressing the 16 pr. which the Prussians and Austrians still drag about.

* * * * *

Artillery officers have differed in opinion as to whether the 8 guns with their limbers should march past, the waggons following behind the 8th gun, or whether each waggon should follow its gun.

Theory and the old orders demand that the 8 guns should be first, in order to come into action with the utmost rapidity after passing a defile, so as to open fire and extinguish that of the enemy; before the limbers are empty the waggons come and take their place. Successive fire after the passage of a defile may indeed allow the enemy to dismount the first guns, and give him for the moment a superiority which may cause the loss of many men.

In general, artillery officers prefer that the waggon should follow the gun. They fear the waggon may make a mistake and get lost amid the perplexities and circumstances of a battle. They feel the want of obtaining every possible security that the waggon shall not be far from its gun, and they can find no other means than by keeping the waggon always under the eye of the No. 1 of the gun.

A limber, containing but 15 rounds of 6 pr. and 6 rounds of shell, is a very slight provision.

It is thought that the waggons of a battery should follow the guns, to obviate the inconvenience of successive fire on issuing from a defile.

Two pack-mules, carrying 2 boxes of 12 pr. ammunition or 15 rounds of 6 pr. each, or . . . of shells, could follow a gun without being in the way or retarding the movement of the other guns. Every 6 pr. would thus find itself with 60 rounds including the contents of its limber, before the arrival of the waggon.

The advantages of two pack-mules per gun or howitzer are numerous. The supply of the 6 pr. can thus be carried to 200 rounds, and that with a single waggon. The waggon might keep out of fire, lessen the number of accidents which throw disorder into a battery, and save the lives of many men and horses. As every mule carries 24 rounds, these would be the first source of supply, and the limber would remain untouched, as it should be, for the moment of retreat or as a last resource. The fire-worker would take the ammunition from a mule within reach of the gun, but out of the line of fire; the other mule would be further in rear. These mules might pass to and fro, deposit their boxes and go to the waggon for new ones, an arrangement which would require that the shells should be carried ready fuzed in the waggons. It would be an advantage for the artillery and for the army to keep the waggons far from the enemy's fire, in ditches, ravines or defiles, which would cause an army to be much lighter in its movements and upon the field of battle. The disadvantage would be inappreciable in retreat, since as soon as its boxes were empty the waggon might commence its retreat 4 or 5 hours before the end of the day.

Every division (*battery*) should also have 4 pack-horses or mules loaded with infantry ammunition, so as to be able to supply the skirmishers without having recourse to the waggons. The places where the most infantry ammunition will be consumed will be woods, and hillocks where waggons could not get and where pack-animals are of very great service.

Often even on plains the waggon meets with many difficulties: it cannot move because the ground is too soft, and when after much

effort the gunners get their pieces into action, it is advantageous not to tire the waggon horses. The more one sees of war the more one understands the utility of having a fourth of the ammunition supply carried on a mule's back.

The 24 prs. weigh nearly 6000 lbs.; it is sometimes difficult to bring them into action under fire. The idea which has been expressed of having light 24 prs. is good. If we had had these pieces in Egypt, we should probably have taken some into Syria by land. It was judged impossible to take the existing 24 prs. across the desert of Katieh, and if we had had four of these pieces in front of Acre, the town would have been taken on the first day. A 24 pr. carronade which was taken at Kaiffa from Sidney Smith's long boat, was placed in a battery, and its effect was incomparably superior to that of the 12 pr., and yet this carronade cannot be compared for effect with a 24 pr. gun. For all places situated in mountainous regions guns of high calibre are necessary, and in many such a position where a light 24 pr. could be taken it would be almost impossible to take the ordinary 24 pr.

It must not be concluded from this that we should substitute the short 24 pr. for the ordinary one, but the short one should be maintained and improved, and the arsenals should have some to provide for extraordinary circumstances.

It would be wrong to say that we thus complicate the equipments of artillery: it is difference of calibre which causes complication.

The 16 pr. has been rightly suppressed. The 12 pr. is sufficient for ricochet fire, direct fire, and for the defence of places and where the 16 pr. might have some advantages, these are not equal to that of supplying a place with the same ammunition as is issued to troops in the field. It was on this principle that we did well in abolishing the 8-in. howitzer. In the same way places should be adapted for 6 prs., so that artillery should have but 4 calibres, the 6, 12, 24 prs. and the 5½-in. howitzer. In this way we abolish 4 calibres.

We should add 3 prs. for mountain equipment. In abolishing the Rostaing guns, we get rid of stubborn beasts not worth the trouble they give. 3 prs. should be a minimum calibre. Some of them are made very light and carry as far as the Rostaing pieces.

* * * * *

The 10-in. mortar has been suppressed, and the 8-in. and 12-in. preserved. The 8-in., which throws a 40 lb. shell, is an excellent mortar: it is the true siege mortar.

The 6-in. mortars appear necessary, both for the attack and defence of places. These mortars, which do not weigh 100 lbs., have the greatest effect in trenches and covered ways. A field artillery park should have twenty of these which can be used with 5½-in. shell, and may be useful against redoubts and villages and thus save the howitzers, the fire of which is very destructive to their carriages.

The question of the 12-in. and 10-in. mortars is not yet decided. The 12-in. throws a 150 lb. shell, the 10-in. only 100 lb. In this respect the 12-in. is to be preferred. Since we have an 8-in. it is useful to have one with far more power, but M. de Gribeanval had

abolished the 12-in. and adopted the 10-in., because he thought that the calibre of 8 or 9 inches was the best for long ranges. The mortars which were cast at Cadiz had less than 9 inches.

More experiments are still required, and if they confirm the old ones, to the effect that the longest ranges are obtainable between 8 and 9 inches, we should then abolish the 8-in. and substitute for them the new calibre. Of course the mortar should have a cylindrical Gomer chamber and the lightest possible for short ranges and beds for long ones.

We should have thus 3 mortars: the 5½-in., the new model between 8-in. and 9-in., and the 12-in.

A mortar shell of the new model would not weigh more than 60 lbs. That is not a sufficient weight and would cause one to feel the want of the effect of a 12-in. shell.

Long-ranging mortars are only useful at particular points of the coast or in places destined to defend a particular point, for the fire is so uncertain, long and difficult that it can be of no use at ordinary times. It was on the occasion of the bombardment of Cadiz that mortars were cast at Seville with a range of 3000 fathoms. The coasts of Flushing, Ile d'Aix and Hyères were armed with these. These mortars, joined to the special carriages which were given to the coast guns to enable them to fire at 45°, were a sufficient defence to drive off the English whenever they attempted to cast anchor in Hyères roads.

* * * * *

Field batteries comprise 2 howitzers per battery, which makes one fourth for them and one third for horse artillery. An equipment of 40 batteries gives 80 howitzers. This has been blamed, but wrongly so. The 5½-in. howitzer is not more expensive than an 8 pr. and this large number of howitzers is necessary to dislodge the enemy from villages, to shatter redoubts, &c. Frederick the Great (called Frédéric II. by Napoleon) was the first to augment the number of howitzers.

If a calculation be made of the equipment of field artillery, according to the proportions which have been adopted in the late wars of 6 and 12 prs. and 5½-in. howitzers, a great economy will be found when comparing it with an equipment of an equal number of pieces on Gribeanval's system.

* * * * *

A battery with six 6 prs. and two 5½-in. howitzers would have in carriages: 8 gun carriages, 2 spare ones, 1 forge, 1 proloug,[1] 6 waggons with 6 and 12 mules, 4 waggons with shell and 4 mules; total: 23 carriages, 121 horses, 1541 rounds and the mules (see note D).

We should have a waggon and a half per 6 pr., which would make: 26 carriages, 130 horses, 1576 rounds.

There are thus 3 carriages, 9 horses and 102 6 pr. rounds more, but 66 fewer howitzer rounds.

[1] See note lower down.

The 6 pr. with pack-mules would have 196 rounds in the first case or 211 in the second; the howitzer 188 or 155.

The double supply would give under the 1st hypothesis 6 carriages more for the 6 prs. and 3 for the howitzers, total 9, which would bring the number of carriages to 31 and the number of rounds to 324 per gun and 300 per howitzer.

Under the 2nd hypothesis the double supply would require 9 gun waggons and 4 howitzer waggons, making 13 waggons and would bring the number of carriages to 39. Difference in the waggons in addition under the 2nd hypothesis: 11.

There would be 406 rounds per gun, and 310 per howitzer.

The 2nd hypothesis gives then 476 rounds, but employs 11 carriages and 64 horses more; now these 64 horses might be replaced by pack-mules with 1500 rounds, but the proportion of 324 for 6 pr. and 300 for howitzer is sufficient and forms exactly a double supply.

In comparing a 12 pr. under the mule hypothesis we find 136 rounds in waggon, 10 in limber and two mules with 12 each, total, 170 rounds; difference, 44 rounds or 3 horses.

In the double supply let us add 2 waggons and we shall have 306 rounds. Under the 2nd hypothesis there would be 6 waggons, which would make 405 rounds. In drawing up a scale, put pack-mules, double supply: 5 mules (3 in front line, 2 in the second at the park) and of the 3 remaining, 2 with the gun, one with the divisional reserve; the 2 of the double supply would be with the general park.

We should count also in each artillery division 2 S.A.A. waggons, so that wherever there is an artillery officer there may be also some cartridges, and I believe also 2 mules carrying 6000 rounds (see note E). A division being supposed to have 3 batteries that would give the value of 7 waggons or 108,000 rounds; as the division is supposed to consist of 12 battalions with 36 mules or 108,000 cartridges, it would thus have 216,000 rounds which would give 27 rounds a man to 8000 infantry.

We will suppose the army up to full strength. The company has 136 men; take away 3 officers, 2 drummers, 2 pioneers, 1 musician, there remain 128. Taking away the fifteenth part for the difference between full strength and the number present, we get 120 present; this, for six companies, makes 720 muskets. In subtracting only the fifteenth we suppose the commencement of the campaign, for, after a few engagements and marches, the difference will be much more considerable.

The 3 battalion-mules will carry 9000 rounds or 12 per man. In adding to the divisional supply half a waggon per battalion we should have 7500 rounds or 10 per man; in adding half a pack-mule we shall still have 2 rounds a man, total 24, which for a division of 12 battalions demands 12 waggons and 6 mules, of which half for each battery reserve, and half for the divisional park.

A half waggon, or 11 rounds per man, will be with the park of the army corps; a half mule per battalion with the same park (which gives 2 rounds a man): so that the division will possess there 12 waggons and 6 mules.

A half waggon and a half mule with the army park: altogether 13 (11+2) rounds per man. A half waggon or 22 rounds on requisitioned carriages or in a depot within the enceinte of the army, at one or two days' march. This ammunition will be in boxes. Another estimate of a half waggon in boxes, but not on carriages. Thus each battalion will have:—

A waggon and a half and 6 mules in service order with the corps, with the division, or at the army corps park and at the general park.

One waggon load in boxes within reach of the army.

That will make 40,000 rounds on waggons and pack-mules in front line, 15,000 at a depot. The 40,000 moveable rounds give from 40 to 50 per man; the 15,000 depot rounds give 20 to 25; total, 70 to 75 rounds a man with the army, 25 rounds at a depot in the second line, at less than 5 marches from the army.

A battalion will thus have 6 mules, of which 3 present with it and 3 with the artillery, and 2 waggons, of which one and a half would be horsed.

A division of 12 battalions will have 6 waggons and 6 mules with it; the same at the army corps park; and the same at the general park of the army. Total 18 waggons and 18 mules, and besides there will be 36 mules with the battalions and belonging to them. That will make 270,000 rounds horsed, 18,000 on park mules, 36,000 on the battalion mules, total, 324,000, which for 8000 infantry gives 40 rounds a man, and the value of 24 waggons at the rear of the army, at less than 5 days march.

We must put then on these carriages 2 waggons per battalion. Suppose 80,000 infantry, or 100 battalions, we should require 200 S.A.A. waggons, of which only 150 horsed, which would only need 750 horses, without counting rejected ones, and 180 pack-mules, and 360 belonging to the corps. That makes 1400 horses to carry the cartridges, which appears to be the mean.

EXPLANATIONS.

The following explanations are from the pen of Captain *de Reviers de Mauny*, a recognized authority on the history of artillery.

Note A.

On the composition of the artillery material.

Since the second half of the 16th century the French artillery have only used guns firing shot at 4, 8, 12, 24 or 32 lbs. The drawings of these guns, fixed for the first time in 1668, were modified by the order of the 7th October 1732 which only preserved the 5 first calibres.[1] Then, after the Seven Years War and after a series of comparative trials carried out by Gribeanval at Strasbourg in 1764, the War

[1] Captain de Mauny omits to state wherein the modification lay. According to the preceding paragraph there were only 5 calibres in 1688.—F. E. B. L.

Minister decided (19th Dec. 1764) that the only guns which in future should accompany an army in the field should be 12, 8 and 4 prs. and a few 6-in. howitzers of a new construction. The other guns were reserved for sieges and for the armament of fortified places. Also tables of dimensions determined and made uniform for the whole Kingdom the mode of construction of gun and other carriages.

In 1774 it was ordered that the arsenals should contain always ready all that was necessary to form 8 field equipments and 3 complete siege equipments. This material was in existence in 1792 when war broke out; it was soon found to be insufficient and, notwithstanding the somewhat irregular activity which covered the national territory with factories, foundries and improvised arsenals, the French armies depended on prizes taken from the enemy as their principal resource. Thus the army which crossed the Alps in April 1796 only possessed 30 guns; a few months later it had nearly 1200, of which 600 were field pieces. Now the calibres used in foreign armies, other than the Spanish army, were 3, 6 and 12 prs.; the French 4 and 8 prs. could not therefore utilise the ammunition found in conquered places. Also, peace concluded, a commission of artillery officers was ordered to study the improvements of which Gribeanval's material was susceptible. Under the energetic impulse of the First Consul and thanks to the activity of General Marmont, then President of the Artillery Committee, the work of this Commission ended in the adoption in year XI. of a much simplified material, the construction of which began forthwith. There were to be only 3 calibres, 6, 12 and 24 prs.; all the others were relegated to the service of the defence of places. The short and the long 24 pr. were allocated to siege work; the 24 pr. (5½-in.) howitzer, the 6 and 12 pr. guns should alone accompany armies in the field.

In consequence of circumstances, both complex and numerous, the new material was only partially sent on service during the campaigns in Austria, Prussia and Poland; it was only for the campaigns in Russia (1812) and in Germany (1813) that the Grand Army could be completely provided with the material of which the Emperor here speaks, and which was almost entirely lost. In 1814 they had to glean all that remained in the national stores: the 8 pr. and 4 pr. reappeared and were finally retained in the Service—chiefly for reasons of national economy.

Note B.

On the origin of howitzers.

The idea of placing on a wheeled carriage a short piece firing almost horizontally hollow bombs or projectiles appears to have had its birth in England or in Holland. The piece received the name of "howitzer, haubitze, obus." It had been adopted by nearly all European armies before the French paid them any attention, altho' they had taken two of them at the battle of Fleurus. In 1740 Field Marshal de Belle-Isle, then Governor of Metz, caused experiments to be made with this invention which had been presented to him as absolutely new. For the campaign in Bohemia Bavaria supplied the French army with some of

these pieces. They served as models for those which were constructed at Douay in 1743, and after that howitzers regularly formed a part of all field artillery equipments.

Note C.

On the meaning of the word, "grenade."

By this word Napoleon doubtless meant "shrapnel," invented by the General of that name, and which had been in use in England since 1803.

An English howitzer and two waggons filled with these shell having been taken at the battle of Albuera (16th May 1811), the Emperor ordered General Eblé,[1] the ad interim President of the Committee (letter of the 22nd Aug. 1811), to have experiments carried out to determine the mode of loading these shell. Thenceforth Napoleon attached great importance to their property of bursting on graze and projecting their contents as far as possible.

Note D.

On the arithmetic of the penultimate paragraph.

The Emperor calculated mentally with extreme rapidity, but often rounded off his numbers. Besides, he dictated very quickly, and the writer, in making his fair copy, had to verify the figures, which he had often had great difficulty in catching.

The Emperor seems to have taken the following data :—

6 pr.: waggon 130 rounds; gun limber 15; mule 24
Howitzer: „ 75 „ ; „ 5; „ 14

Guns had normally 6 horses, other carriages, some 6, some 4. To facilitate his calculations Napoleon counted 5 horses per carriage (see *Correspondance Militaire*, Vol. X., p. 319).

That being granted, the figures of the penultimate paragraph should, it would appear, be read as follows :—

A battery of six 6 prs. and two 5½-in. howitzers (with ordinary supply) would have 23 carriages (without the proloug[2]), 115 horses, 1544 rounds, and 16 mules.

We must now put a waggon and a half per 6 pr. (total 9 waggons) which would make 26 carriages, 130 horses and 1590 rounds. There are therefore 3 carriages, 15 horses and 102 6 pr. rounds more, but 16 mules and 56 howitzer rounds less.

The 6 pr. with ammunition mules would have 196 rounds (1173 ÷ 6),

[1] They tell a good story of Eblé. He was a horse artillery captain at the outbreak of the Revolution and his men were a rough and insubordinate lot. One day he told a gunner to dismount. The man wouldn't, but replied: "La république m'a f⁂t⁂ un cheval pour que je monte dessus. Eblé replied: "Elle t'a aussi f⁂t⁂ un capitaine pour que tu lui obéisses." And Eblé pulled him off his horse.—F. E. B. L.

[2] Captain Rollin, the Commandant's deputy in the service of the Revue d'Artillerie, informs me that the name "prolouge" in Napoleon's time was occasionally given to the divisional ammunition waggon. The word does not belong to the existing nomenclature of artillery material, but is often used colloquially to designate certain old fashioned waggons now only used for fatigue duties. These waggons are like the service forage waggons except that they have closed instead of open sides. Neither of these meanings of "prolouge" is given in Littré.—F. E. B. L.

and under the 2nd hypothesis, 212 (1275 ÷ 6). The howitzer in the first case 185 (371 ÷ 2), and in the second case 157 (315 ÷ 2).

To have the double supply we require under the 1st hypothesis 6 carriages more for the 6 prs. and 3 for the howitzers, total 9, which brings the total number of carriages to 32 and the number of rounds per 6 pr. to 196 + 130, or 326 and per howitzer to $185 + \frac{3 \times 75}{2}$, say 307.

Under the 2nd hypothesis a double supply would demand 9 gun and 4 howitzer waggons more, 13 in all, bringing the total of carriages to 39. The total number of battery waggons would be 26 under the 2nd hypothesis, and 19 under the 1st—a difference of 7 waggons. The number of 6 pr. rounds would be $212 + 130 + \frac{130}{2} = 407$, and of howitzer $157 + \frac{4 \times 75}{2} = 307$.

The 2nd hypothesis has therefore an increased total of (407 — 326) 6 = 486 rounds, but employs 7 carriages and 35 horses additional. Now, if these horses were replaced by pack-mules, the latter would carry 35 × 24 = 840 rounds, or a further increase of 840 — 407 = 433 rounds. But the proportions obtained under the 1st hypothesis of 326 for 6 pr. and 307 for howitzer are sufficient and form exactly a double supply.

Note E.

The calculations in the last paragraph.

At first sight many of them appear to be erroneous, and it would seem in dictating them the Emperor was following in his mind the development of an hypothesis which he never ennuciated, so that it is no easy task to unravel them.

However that may be, the basis of the imperial arithmetic was probably the following:—

S.A.A. waggons, about 15,400 rounds, or rather more than 21 per man in a battalion with 720 rank and file.

Mule, 3000 rounds, say 4 rounds per man of the battalion.

With these data the paragraph should apparently be read as follows from the 3rd line:—

The 3 battalion mules will carry 9000 rounds—say 12 per man. In putting with the army division a half waggon per battalion, we have 10 rounds per man and adding half a mule per battalion, *i.e.* 2 rounds per man, we get 12. The division will then have 24 rounds a man. If it be composed of 12 battalions, that implies, in addition to the 36 battalion mules, 6 waggons and 6 mules which will be placed: 1 waggon and 1 mule in each of the 3 battery reserves, and 3 waggons and three mules in the park of the division.

At the park of the army corps there will be per battalion a half waggon and a half mule, or 6 waggons and 6 mules carrying 13 rounds a man.

The same at the park of the army.

A half waggon per battalion, or 11 rounds a man, horsed, on requisitioned carriages.

Thus every battalion will have a waggon and a half, horsed, and $4\frac{1}{2}$ mules, present with it . . . . that will make 36,000 rounds horsed or on pack-mules, and 15,000 at the reserve depot.

The 36,000 rounds horsed give 50 rounds a man, and the 15,000 give 20, total 70. There will be besides, at depots in the second line and at less than 5 marches in rear, 25 rounds a man.

A battalion will thus have $4\frac{1}{2}$ mules, of which 3 with it and 3 halves with the artillery, and 2 waggons of which $1\frac{1}{2}$ horsed. Similarly a division of 12 battalions will have 36 mules with and belonging to the battalions, 6 waggons and 6 mules at the divisional park, the same at the army corps park and the same at the general park. Total, 18 waggons and 18 mules in addition to the 36 battalion mules, or $(18 \times 15{,}000) + (18 \times 3000) + (36 \times 3000) = 432{,}000$ rounds, which gives 50 rounds a man to 8640 rank and file. There would also be at the rear of the army at less than 5 days march the value of 14 waggons, or about 25 rounds a man.

We see we should have to put on wheels the contents of 2 waggons per battalion (of which one and a half horsed). So an army of 100 battalions would require 200 S.A.A. waggons, of which 150 would be horsed, only requiring therefore 750 horses (without counting lame ones) and 250 pack-mules in addition to the 300 battalion mules. That makes from 1300 to 1400 horses and mules to carry the cartridges, which appears to be the mean.

THE ARTILLERY OF JAPAN.

BY

LIEUTENANT A. W. PACK-BERESFORD, R.H.A.

During May of this year I found myself in Tokio the capital of Japan. I had some time on my hands so I thought I would make a call on the officers of the Japanese Artillery. I proposed to my guide that we should go to the Artillery Barracks, and that he should introduce me, but he was horrified at the idea and said such a thing had never been done before. He tried to dissuade me, but at last, after a consultation with the hotel-keeper, he said if I insisted on going, I had better, first go and see Colonel Fukashima; the Colonel, he told me, had travelled all over the world, and could talk English, besides about six other languages. I gave in so far, but was rather startled when I was taken to the War Office of Japan. However it turned out to be the best thing I could have done. I was only kept waiting two or three minutes after I sent up my card, when Colonel Fukashima came to see me in person. He most courteously promised to send a war office interpreter to my hotel next day, who would take me to the barracks and show me everything I cared to see. He was as good as his word, and next morning Mr. H. Kakogi came to call for me and took me off to the barracks. I found that the bulk of the artillery were at a practice camp about forty miles away, which I subsequently got leave to visit. I will first note down what struck me as regards their personel and equipment, and then describe what I saw at the camp.

The artillery is at present divided into seven regiments of which the "Artillery of the Imperial Guard" is one.

It was this regiment to whose camp I went.

The artillery is considered a corps d'élite in Japan and the best officers and men are selected for it.

The Artillery of the Guard may be taken as a fair type of a Regiment of Artillery. In equipment and organization they are all on the same footing.

The regiment is commanded by a colonel. It is divided into three squadrons, each with a commander, and each of these again is divided into two batteries. The battery contains three sections and six guns, the officers correspond to ours in their duties and posts; but there is no fifth wheel.

The commander of the squadron is responsible for the tactics and

target of the batteries. The captain of the battery fights it, trains it, and is responsible for its personel and fire discipline.

The gun is made of gun metal. The breech is closed by a side actioned interrupted screw breech block. It is locked by a nut on top. All the guns are made in the arsenal at Osaka.

It seemed to be curious, that a nation so up to date as Japan, should not have a steel gun. But I was told that they import steel rods from France for their rifle barrels, and, no doubt, they cannot trust themselves to work in steel yet; so prefer a reliable bronze gun, to an uncertain steel one. In most details of equipment, such as handspikes, fuzes, shells, vents, etc., they are so much like us, that it is scarcely worth noting the difference, but the heads of the sights were unlike any I had seen. The fore-sight and tangent scale have similar heads, and one picture will do for both. The tangent scale has a small window and a deflection leaf which the fore-sight has not.

To lay the gun, you look through the window of the tangent scale, and get the object between two points of the fore-sight. I tried myself and it seemed to me, to be very easy to lay with. One cannot tell all about a gun by looking at it, but I should think it was about the same in power as our 2·5 inch gun. Perhaps somewhat below it.

The harness is not cleaned at all according to our ideas, but all the leather is soft and the working parts oiled. They have breast harness and rope Australian girths. The riding horse has a bit and the off horse is led in a snaffle. They have flat traces and the lead and centre set a direct pull on the swingle tree.

Wallets, shoepockets, whips, etc., all like ours.

The kit is carried on the off horse in two large saddle bags. They have pole draught.

Three men ride on the limbers and two on the axletree seats.

The Nos. 1 and officers ride.

The guns can do about five or six miles an hour. They are not expected to work with cavalry.

The horses are stout cobs about 14. 1. high. They are the stamp of our Exmoor ponies, but they are rather lacking in bone below the knee. Bad tempered horses are castrated, all the others are entire. Mares are not used. They get a ration of eleven pounds of hay and two gallons of barley. They are groomed and fed twice a day. All the horses I saw were in good condition, and well turned out. In camp they are tied up to a picket rope, 2′ 6″ high, with two head ropes. No heel ropes are used. The horses are cast for age at fourteen. The men are very well trained, the gunners go to laying, and the drivers to riding-school every day. I saw a lot of men laying, and they seemed to carry out their instruction much as we do.

I travelled down to Narashchino Camp with Mr. Kakogi. I found him a most interesting companion. He had been present at one or two of the naval fights in the China war. He told me that Captain Mahan's book had been translated in Japanese and that he had read it.

About an hour's rail took us to the camp.

A sergeant met us, guided us to where Colonel Kumamoto was, and I was introduced to him.

The colonel told me I had come on a very good day, as it was the first day they were to fire live shell. Directly after I arrived the series began. I don't quite know what I expected but I was fairly astonished at what I saw. I might have been at Okehampton once again.

The battery which was going to fire, was under cover about four hundred yards in rear of its position. When the colonel gave the order it was brought up under cover and halted behind the crest of a hill. The guns were run up by hand. The whole thing was just as we do it. The range finders were on a flank; an officer was sketching the position. The battery commander observed for himself and bracketted his target and rapped out his alterations in elevation as smartly as possible. The colonel with a course of officers (including a cavalry officer) was looking on from a little way off. The sergeant-major was keeping the range book. The limbers were taken away under cover, till the series were finished. The fire discipliue was very good indeed. They fired a series of eighteen rounds and took about ten minutes to do it. They were not working against time as it was the first day.

After the series was over, the commander of the battery had up the layers and Nos. 1, and criticised the practice to them. When he had finished, the colonel gave a short lecture to him and the other officers on the morning's work. The battery had fired at an unknown range which proved to be about 1300 metres. The target was very indistinct, but the range had been found and some effective shrapnel got in. I was introduced to Lieut. Shekuni Soga, who had been ten years in France, he very kindly showed me round the lines and barracks, but my French was so lame, halting, and mixed with Hindustani, that I was not able to grasp all the information he gave me. After I had seen all there was to see, the colonel gave me some refreshment in his hut. I asked him some questions about the practice and he at once referred to the range report which he had been working out, and told me what I wanted to know.

The batteries had been in camp for two weeks and as they had only twenty rounds per gun, they had spent those two weeks in drill and practice with blank, and only in the last week did they use their live shell.

I was very much struck with the thoroughness of everything I saw.

I went to the harness store and saw all the spare harness, carefully put away in soap and oil.

All the working parts of the gun are most carefully oiled and looked after.

Of laying which we have only come to consider vital during the last ten years, they do more than we do.

I could not tell whether the shooting was good or what the power of the gun was. But I am quite sure that whatever faults they have they see and will make it their business to rectify very quickly, and that though their gun may not be very mobile and be of low power, they will

get the utmost of that power out of it. The artillery is being augmented by one quarter.

I was, when I went to Japan, under the impression that it was a very small country, but the following figures rather open one's eyes :—

The area of Great Britain is one hundred and twenty thousand square miles, and its population is thirty nine million.

The area of Japan is one hundred and sixty thousand square miles, and its population is forty one million.

Add to this that those forty one million are saturated with an ardent and burning patriotism—that they are led by an aristocracy whose ideas of honour and self devotion are equal to ours—and that in power of organization they are admitted to be behind no race in the world.

Consider all this and one must admit that the nation of Japan will be a very vital factor in any war, in which it decides to take part.

ARTILLERY UNDER THE STUART KINGS, 1424-1625.

BY

CHARLES DALTON, ESQ.

(Editor of "English Army Lists and Commission Registers, 1661–1714.")

WHATEVER may be alleged against the Stuarts as men and monarchs, it still remains an undeniable fact that they all were, with one notable exception, patrons and promoters of the science of artillery which made rapid strides during the stormy reigns of the early Stuart sovereigns. Fate decreed that one of the Stuart monarchs should be killed by the bursting of one of his own guns at the siege of Roxburgh, and that his royal grandson should fall at Flodden; but when one considers that two of the Stuart line were assassinated, that two were beheaded, that one died of grief at the disgrace which befell his rebellious army, and that one died an exile in a foreign land, it may be said that the two sovereigns who died with their faces to the foe were happy in their deaths.

After a weary captivity of nineteen years in England, James I. returned to Scotland in 1424. In addition to his many accomplishments, James was well practised in all martial feats and exercises. His companionship with Henry V., who had taken the young Scots monarch to France to initiate him in the art of war, was of the greatest advantage to James when at last the reins of government fell into his capable hands. As a spectator of some of Henry V.'s victories in France, the King of Scots knew the value of artillery and was quick to see that the possessor of "engines of war" could dictate terms to rebellious nobles who retired behind their portcullises and bid defiance to their anointed sovereign.

James imported several large pieces of ordnance from Flanders, one of which struck wonder into the heart of the simple-minded Scots chronicler, who describes it as "machinam bombardicam appellatam Lyoun." The "Lion" did not have much occasion to roar in James I.'s reign, but it was probably one of the "engines of war" brought by the King, in 1436, to besiege Roxburgh, which fortress had been

in the possession of the English since the battle of Neville's Cross, near Durham. Little is known of this siege, but it is on record that the warlike engines broke down when battering the walls of the beleaguered fortress and the siege was raised. A few months after this event, the King of Scots was basely assassinated and the Crown passed to his son, a boy of six years. When James II. arrived at years of discretion, he set himself the task of putting his kingdom into a proper state of defence. By his desire, Parliament took this weighty matter into consideration and, in 1456, declared that the King ought to make it a special request to some of the richest and most powerful barons—

> "That they make carts of war ('crakys of weir'); and in each place two guns, each of which was to have two chambers ('chamerys'), to be supplied with the proper warlike tackling ('graith'), and to be furnished also with a cunning man to shoot them. And if they have no skill in shooting with them at the time of passing the Act, it is hoped that they will make themselves master of it before they are required to take the field against the enemy."[1]

In 1460, James II., having espoused the cause of Henry VI. against the Yorkists, determined to march into England at the head of a large army. He opened the campaign by besieging the fortress of Roxburgh in person. A battery having been planted, the King went to examine the same. Of the cannon which composed this battery was one of the large Flemish guns imported into Scotland by James I. and is thus described:—

> "It was constructed of longtitudinal bars of iron, fixed with iron hoops, which were made tight in a very rude manner by strong oaken wedges. This piece, from the ignorance of the engineer, had been overcharged and as the King stood near, intently observing the direction of the guns, it unfortunately exploded and struck the monarch with one of its massy wooden wedges in the body. The blow was followed by instant death, having fallen upon the mortal region of the groin and broken the thigh."[2]

This lamentable occurrence was mourned throughout the army and the country. The nobles, in despatching a message to the court, desired the immediate presence in camp of the Queen and her eldest son, a boy of eight years. The late monarch's widow, who was a high-minded and courageous lady, set out for the army on hearing the doleful news and brought the little King with her, whom she presented to the barons. She requested that the siege might be continued at once. The presence in camp of the young King and his mother stimulated the leaders of the army, and the soldiers, to press the assault with the utmost vigour, and Roxburgh, which had been held for a hundred years by the English, was carried by storm.

[1] "Acts of the Parliament of Scotland," Vol. II., p. 45.

[2] Tytler's "History of Scotland" (adit. 1866), Vol. IV., p. 150.

James III. was an accomplished, but not a warlike prince. He had, however, inherited his father's and grandfather's taste for gunnery and did more than either of his predecessors for the artillery service:—

> "The construction of cannon, and the proper method of pointing and discharging them, appear, from contemporary records, to have been one of the subjects to which not only the King himself directed particular attention, but which he anxiously encouraged in his nobility, and even amongst his clergy. Artillerymen and skilful artisans were procured from the continent; and some of the principal entries in the treasurer's books at this period relate to the experiments made in the practise of gunnery, an art still in its infancy in Scotland." [1]

It is recorded that at the siege of Dunbar Castle by the royal troops, in 1479, the cannon mounted on the castle ramparts were so well served and pointed that a single ball killed three of the best knights in the besieging army.[2] In 1482, the King, at the head of an army of 50,000 men, marched towards the border to repel an invasion of the English under the Duke of Gloucester, who had espoused the cause of the rebel Duke of Albany, the King's brother. The important command of the artillery train which accompanied the Scottish army was bestowed by James on his favourite Cochrane, who had arrogantly assumed the title of Earl of Mar. The splendour of this upstart's camp furniture, retinue, and personal attire, have never been surpassed, or even equalled, by any subsequent Master-General of the Ordnance:—

> "His tent, or pavilion, was of silk; the fastening chains were richly gilt; he was accompanied by a body-guard of 300 stout retainers, in sumptuous liveries, and armed with light battle-axes; a helmet of polished steel, richly inlaid with gold, was borne before him; and, when not armed for the field, he wore a riding suit of black velvet, with a massive gold chain round his neck, and a hunting horn tipt with gold, and adorned with precious stones, slung across his shoulder." [3]

The deep-rooted conspiracy to dethrone James III. took effect at Lauder, where the Scottish army was encamped. The rebellious nobles, headed by the Earl of Angus, who was now to win the *sobriquet* of "Bell-the-cat," having first secured the King, seized the unfortunate Cochrane and hanged him by a halter over the parapet of Lauder bridge. It is said that this ill-starred favourite vainly begged that he might not be put to death with a common rope, but that at least one of the silk cords of his tent equipage might be used. With Cochrane perished, in the same ignominious manner, some of the King's humbler favourites.

Six years after the above events we find James III. once more in the field trying to crush a rebellion. His eldest son was on this

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[1] Tytler's "History of Scotland," Vol. IV., .

[2] *Ibid.*

[3] *Ibid.*, p. 232.

occasion in arms against his father, whose forces were much inferior in numbers to the insurrectionists. The King's defeat was followed by his flight and his subsequent assassination, and James IV. reigned in his stead.

In 1489, James IV. proceeded to the siege of Dumbarton, which was at that time held by a rebellious Scottish baron. It was on this occasion that the monster Flemish gun, which now overlooks Edinburgh from the Castle battery, first came into notice.

"Mons Meg," as this ancient gun has long been styled, was then simply known as "Mons," which was the name of the Flemish town where it was cast, and under date of 10 July, 1489, appears the following entry in the Treasurer's books :—

> "Item given to the gunners to drink-silver when they cartit Mons, by the King's command, 13 shillings." [1]

When James sat down before Norham, in 1497, Mons was conveyed to the siege at no small expense. Under date of 24 July, 1497, we find this entry :—

> "Item to pynouris to bere ye trees to be Mons new cradill to her at St. Leonards quhare sche lay, III sh. VI d." [2]

And again, 28 July, 1497 :—

> "Item for XIII stane of irne to mak graith to Monsis new cradill . . . . XXX sh. IIII d."
>
> "Item to VII wrights for twa daysis and a half ya maid Monsis cradill, XXIII sh. IIII d."
>
> "Item for XXIII li of talloun (tallow) to Mons."
>
> "Item for VIII elne of canwas to be Mons claiths to cover her."
>
> "Item for mare talloun to Mons."
>
> "Item to Sir Thomas Galbraith for paynting of Monsis claiths, XIIII sh."
>
> "Item to the Minstralis that playit before Mons doune the gait, XIIII sh." [3]

James possessed an able master-gunner in the person of Robert Borthwick, who was described in a royal charter as "magnalium nostrorum fundator et fabricator." And when the Scottish army marched into England, in August 1513, Borthwick acted as master of the ordnance to the train of artillery which was said to be "superior to that which had been brought into the field by any former monarch of Scotland." Unfortunately for James, he had no genius for war and was too proud and obstinate to take the advice of those who had. A splendid opportunity presented itself shortly before the two rival armies met on Flodden field. The Scots, from their coign of vantage on Flodden hill, could have played with their artillery on the advancing

[1] Tytler's "History of Scotland," Vol. IV. (Appx.), p. 361.
[2] *Ibid.*
[3] *Ibid.*, "Muckle Meg" was captured with other ordnance in December 1650 by Cromwell when he took Edinburgh Castle.

English troops, who had a bridge to cross, and thrown their ranks into disorder before charging down on them. This golden opportunity is thus described by an able historian :—

> "The army of the Earl of Surrey was still marching across the bridge, when Borthwick, the master of the artillery, fell on his knees before the King and earnestly solicited permission to bring his guns to bear upon the columns, which might be then done with the most destructive effect; but James commanded him to desist on peril of his head, declaring that he would meet his antagonist on equal terms in a plain field and scorned to avail himself of such an advantage."[1]

The result of this ill-timed chivalry, or rather Stuart obstinacy, is well known. In addition to their monarch, Scotland had to mourn the flower of her nobility and thousands of her best soldiers. All the artillery, consisting of nearly a score of cannon "of various shapes and dimensions, amongst which were six guns admirable for their fabric and beauty, named by the late monarch the Six Sisters," fell into the hands of the English. The Earl of Surrey is said to have declared that some of the captured ordnance excelled any in the English arsenals."[2]

In 1540, the Parliament of James V. enacted that "Landed men were to have, in proportion to their valuation, hagbuts, small artillery and ammunition with men for fixing them."[3] In the same year an army, which was to include "a train of sixteen great and sixty lesser cannon," was ordered to be ready to take the field within twenty days after Easter."

When James, two years later, assembled 30,000 men and a train of artillery, with which force he proposed to invade England, he found the leaders of his army so rebellious and unmanageable that he was obliged to disband his troops and return to his capital. His chagrin, at being reduced to a cipher, was soon afterwards doubled at the ignominious defeat of 10,000 Scots troops, at Solway Moss, by a small body of English horse under Lords Dacre and Musgrave, who surprised the Scottish camp at the moment when discord and divided councils were rife. This national disgrace broke the King's heart and he died at his palace at Falkland, 13 December, 1542, leaving an infant daughter of six days old.

Passing over the minority and so-called reign of the hapless Mary Queen of Scots, we arrive at the gloomy period of Scottish history when the Earl of Lennox was chosen Regent, which was in the year 1570. In this same year the Earl of Sussex marched from Berwick into Scotland with an army well supplied with both field and siege artillery. He destroyed several towns and castles of importance. The Scottish ordnance had now reached a very low ebb indeed. At the battle of Musselburgh, in 1547, the Duke of Somerset had captured some of the best artillery in the kingdom and the rival factions, which

[1] Tytler's "History of Scotland," Vol. V., pp. 61–2.
[2] *Ibid.* p 67.
[3] "Acts of the Parliament of Scotland,"

had succeeded each other in power, had not troubled themselves to import, or manufacture, fresh cannon. This accounts for the royalist forces, under the Earl of Argyle, taking the field, in 1594, without any artillery and for their defeat by the Earl of Huntly's little force at the battle of Glenlivat.[1] In this sanguinary engagement Argyle's force numbered 6000 fighting men while Huntly's was scarce a third of that number. But Huntly was able to bring a small train of artillery into action under the command of Captain (afterwards Sir) Andrew Gray, who commanded the English and Scottish auxiliaries in Bohemia in 1620. Making all due allowance for the youth of James VI., his ignorance of warfare and his exhausted treasury, one still cannot refrain from surprise at his making no effort to provide his army with artillery when he attempted to crush the powerful Roman Catholic faction in Scotland by force of arms. History tells us that when James V. went in person to reduce Tantallon Castle, "he borrowed from the castle of Dunbar, then belonging to the Duke of Albany, two great cannon, two great botcards and two moyans, two double-falcons and four quarter-falcons, for the safe-guiding and re-delivery of which three lords were laid in pawn at Dunbar."[2] But James VI. of Scotland and I. of England had no taste for the music of war and left the artillery in the state he found it. We are told by one of his English courtiers that this monarch "naturally loved not the sight of a soldier nor of any valiant man." The Prince of Wales, however, had all the martial tastes and instincts of the early Stuart Kings, and it was to him that the English army looked as a future upholder of the national honour. In 1610, James grudgingly sent a British contingent of 4000 men, under Sir Edward Cecil, to help Maurice of Nassau in the reduction of Juliers. There are still extant three letters from General Cecil to Henry Prince of Wales, describing the siege and capture of Juliers wherein the British gained great renown. The Prince evinced the most lively interest in the details sent him of this siege, and at the time of his death, in 1612, a set of artillery models, made by a Dutch artillerist in Holland, were to have been purchased for the Prince of Wales. These models were brought to the Prince's notice by Sir Edward Cecil, who undertook to purchase them for £1000. The death of Prince Henry temporarily stopped negotiations, but on 21 October, 1615, we find Cecil writing from Utrecht to Mr. Thomas Murray, tutor to Prince Charles, as follows:—

> "The devotion I did bear to the service of the late Prince hath continually applyed me (according to my duty) to the study of what may be profitable to this . . . . I have found in the hands of an officer of this Army (who is very cunning) certain models of all Instruments and Engines necessary to an Army, especially concerning all manner of Artillery that Prince Maurice hath by long experience found fittest . . . . which in my opinion would be a fit object for his Highness to bestow some of his time upon."[3]

[1] Known in ballad literature as the battle of Balrinnes.
[2] "Marmion," note 15 to Canto 5.
[3] "Life of Sir Edward Cecil, Viscount Wimbledon," by Charles Dalton, Vol. I., p. 235.

The matter was referred to Sir Dulley Carleton, Ambassador at the Hague, who replied to Mr. Murray :—

> "There is nothing but the price which makes me suspend my advice, otherwise I should judge them fit for a Prince because he may read in them a soldier's lesson, *en petit volume*, and make himself perfect in his chamber against he comes into the field."[1]

Prince Charles left the decision of the purchase money to Sir Horace Vere (Master-General of the Ordnance in the next reign) and Sir E. Cecil. On 21 September, 1616, Edward Sherburn (a future Clerk of the Ordnance) announced to Sir D. Carleton the arrival of the models at St. James's Palace, where they were to be set up by the Dutchman who had brought them. And a month later we find Sir Horace Vere writing to Sir D. Carleton to the effect that the Prince was delighted with the models.[2]

On 27 March, 1625, James I. of England died and was succeeded by his son Charles, who rushed headlong into a war with Spain. Did not the ill-success which attended Charles I. in war, from the very beginning to the very close of his stormy reign, spring more from mismanagement than from any other cause? Ill-luck is only another name for bad management.

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[1] "Life of Sir Edward Cecil, Viscount Wimbledon," by Charles Dalton, Vol. I. p. 237.

[2] *Ibid.*, p. 238.

THE MAIZAR AFFAIR.

BY

CAPTAIN L. C. GORDON, R.A.

The frontier beyond Bannu was recently the scene of one of those sudden bursts of fanaticism and treachery, which are the main features of the Pathan character, and as the occasion served to bring out prominently, several acts of heroism on the part of officers and men of the Royal Artillery, which add yet another laurel to the glorious record of the Regiment, a brief description of the gallant conduct of all ranks of—

"Number 6 Bombay Mountain Battery,"

which so distinguished itself on this trying day, and of which battery it was afterwards said in official despatches, "the conduct of the battery was beyond all praise," will, I feel sure, be of interest in the Proceedings of the R.A. Institution.

The scene of the fight was at Maizar, situated in the Tochi valley, roughly 80 miles W. of Bannu and five miles from Dotoi, on the Afghan frontier, on the 10th June, 1897.

12 Sabres, 1st Panjab Cavalry;

2 Guns, No. 6 Bombay Mountain Battery, under Lieutenant H. A. Cruickshank;

200 Rifles, 1st Sikh Infantry, under Lieut.-Colonel Bunny and Lieutenant Higginson;

100 Rifles, 1st Panjab Infantry, under Lieutenant Seton Browne;

Surgeon-Captain Cassidy, 1st Sikhs, and Captain J. F. Browne, Commanding No. 6 Bombay Mountain Battery, who accompanied the force to obtain information for the Intelligence Department, formed an escort to the Political Officer, Tochi valley. He was proceeding to Maizar, which is 13 or 14 miles from the frontier camp of Datta Khel, to select the site for a new post and to settle the distribution of a fine which had been levied for a murder.

Maizar was reached at 9.30 a.m. A place was shown by the Chief Malik (headman) where the troops could rest, the intention being to return in the cool of the evening to Datta Khel. This resting place was on a terrace under some trees and near to Drepilari. The Political Officer, together with Captain Browne, R.A., and Lieutenant Higginson, 1st Sikhs, at once rode on with a few sowars to Dotoi and returned to Maizar at about 11.30 a.m., where all the officers had breakfast under

a large tree. The people of the village seemed perfectly friendly, wood and grass were brought in abundance and at noon specially prepared food was brought down by the Maizarwals for the Mahomedan sepoys, and point was made of the British officers partaking of it.

At this time all saddles were off, but, fortunately, arms had not been piled, Colonel Bunny having ordered that every man should keep his rifle by him. The two guns only had one pair of boxes, or—

10 Shrapnel
4 Common } per gun.
2 Case shot

And the infantry 20 rounds a man.

Pickets and guards had been placed out and every ordinary military precaution taken.

At about 2 p.m., after lunch, the pipes of one of the regiments were being played at the request of the villagers, and having played one tune, they were about to commence another, when the villagers, who had been mingling with the sepoys, suddenly cleared off towards Deepilari. It was at once seen that something was wrong.. The order to fall in was given and at that moment a signal shot was fired and an irregular volley was poured in from the walls and towers of the village at distances varying from 5 to 120 yards! The first volley, judging from its effects, must have been aimed at the officers, who were sitting together.

Lieutenant Seton Browne was hit in the thigh at the second or third shot and Colonel Bunny was mortally wounded in the stomach whilst trying to join his men, and Lieutenant Higginson was shot in the left arm at the same time.

The two Royal Artillery officers had rushed to their guns and opened fire with case on men charging from Deepilari and did great execution.

The guns were in the open and about 10 yards from a wall, over which a deadly fire was kept up.

Captain Browne was hit in the arm at about the third round from the guns and bled profusely, but, having had it bound up by the salutri (native farrier), continued, as far as possible, to give directions.

Lieutenant Cruickshank was hit in the arm about the eighth round, but continued giving orders until again hit, this time through the heart.

Havildar Umar Din of No. 4 gun was shot in the left shoulder, but continued his work at the gun.

The drivers, during this heavy fire, had run to their mules, saddled them up and, until absolutely ordered to desist by Captain Browne, were trying to load up all the great coats, which were lying in bundles on the ground.

Many a cool act of bravery must have been done by these men in a steady soldierlike manner, and it is a matter for great regret that, with the exception of Driver Havildar Rur Singh, who rendered the greatest assistance in limbering up, it was found impossible to single out any

one man who had shown courage superior to his comrades, and this, in itself, speaks volumes for the discipline and behaviour of all the drivers.

Havildar Nihal Chand having fired away all his rounds, had nothing but blank left, and with this he fired three rounds, "just," as he modestly expressed it afterwards, "to keep the guns going."

Gunner Jawala Singh having removed Lieutenant Cruickshank's body to the rear, at once returned to his gun and, in conjunction with other men, continued firing and displayed a contempt for danger truly praiseworthy.

When the order was given to retire, the wheel-mule of No. 4 subdivision was killed and Havildar Umr Din, already wounded picked up a wheel in each arm and tried to take them off. Poor fellow! he was shot through the head in the attempt and the wheels were lost.

About the most heroic incident of the day took place during the retirement.

It was previously mentioned that the guns were close to a garden wall, from which a galling fire was kept up and which, had it continued, must have entirely prevented their withdrawal.

Subadar Sundar Singh of the 1st Panjab Infantry, with 10 volunteers, seeing the plight of the guns, attacked the enemy over the wall with bayonets, and the devoted band were all slain whilst covering the limbering up of the guns.

Sponges, small stores, great coats had to be abandoned owing to the order to retire and from no wish of this indomitable battery.

A general retirement was ordered by Colonel Bunny towards some low hills E. of the village, and this was done in a steady, determined manner, all wounded officers and men being passed to the rear before a movement was made.

It was during the first retirement that Surgeon-Captain Cassidy, who had been attending Lieutenant Seton Browne, was shot through the knee and he has since succumbed to his wound.

Lieutenant Higginson had the misfortune to be shot a second time through the left arm whilst crossing a ridge during the retirement, but both he and Lieutenant Seton Browne continued to give orders.

Having crossed these hills, closely followed by the enemy, a stand was made at 5.30 p.m. in a sloping plain (it having taken 3½ hours to come three miles), and it was here that Captain Browne, whose wound had broken out afresh, and Colonel Bunny both died.

At the first attack, sowars had been sent back to Datta Khel for help, and reinforcements, under Lieutenant de Brett, R.A., arrived at 6.15 p.m., having covered nine miles over vile ground in 1½ hours.

Only about five rounds a man were then left to the infantry, whilst the guns had long since expended all theirs, and it can be pictured how welcome the arrival of fresh ammunition was.

Lieutenant de Brett found, on his arrival, that there was only one gun in action, the wheels of the other having been lost, but with this and the aid of a rifle as a rammer and no water, the enemy on the heights were effectually shelled and scattered, and although, just

previous to the arrival of reinforcements, they appeared to be collecting for a final rush, they cleared off on seeing them and the remainder of the distance to Datta Khel was covered without molestation.

The rear-guard reached camp at midnight, and so ended a day which (as a glance at the casualties noted below will show), if disastrous in its results, was yet made glorious by the heroism displayed by all ranks, under most trying circumstances.

3 British officers *killed* (including two Royal Artillery officers).
3 „ „ wounded (one since died).

Thus every British officer out with the force was either killed or wounded.

No. 6 Bombay Mountain Battery :—

1 Havildar and 1 driver *killed.*

1 Lance naick (since died) and 1 gunner, 1 driver, 1 kahar wounded.

3 Ordnance and 1 baggage mule killed.

5 Ordnance mules wounded.

1st Sikhs :—

13 Men *killed,* 21 wounded.

1st Panjab Infantry :—

1 Subadar (the gallant SUNDAR SINGH) and 7 men *killed* and 4 men wounded.

1st Panjab Cavalry :—

1 Man wounded.

A month afterwards, on a full divisional parade, Major-General Bird, Commanding the "Tochi Field Force," announced that the Government of India had been pleased to at once bestow the 3rd Class Order of Merit on—

"Havildar Major MAHOMED ISMAIL, No. 6 Bombay Mountain Batty.,"

as well as to the senior native officers of the detachments present at Maizar "for conspicuous gallantry in the face of the enemy" and "that the 2nd Class Order of Merit would have been bestowed on Subadar SUNDAR SINGH, 1st Panjab Infantry, had he survived." And that further rewards would follow as soon as reports reached Governments.

N.B.—The Havildar Major received this distinction in addition to his gallantry for having been the senior native non-commissioned officer present with the guns, no native officer having been on parade that day.

As I write this, some weeks after, the smoke from Maizar and the dust from falling stones of neighbouring villages, proclaims that retribution is being enacted for this cowardly attack.

JAN 24 1898
U.S. PATENT OFFICE

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PRÉCIS
AND
TRANSLATION.

"REVUE MILITAIRE DE L'ETRANGER."

APRIL, 1896.

THE MILITARY CYCLE IN GERMANY.

BY

LIEUT.-COLONEL J. H. G. BROWNE, *late* R.A.

The military cycle, although only a product of yesterday, has already taken an undisputed place in modern armies and its employment has everywhere been officially sanctioned.

The advantages offered by it, with regard to rapidity and to economy of forces, have made it *par excellence* the means of communication, both on the march and when stationary. But the employment of cyclists has, until very lately, been generally limited to the modest, if useful, *rôle* of carrying messages and, although some ardent professors of cycling have claimed for them the position of combatants, they have but indifferently succeeded in overcoming prejudices, which were all the stronger because no definite experiment had yet taken place to weaken them.

Some isolated but successful experiments had, however, opened people's eyes and led them to recognize the services which cyclists might render, not indeed in the combat properly so-called, but in the period of exploration and approach which precedes the actual collision. What was wanted for the further employment of cycling was a trial made on a fairly large scale and under conditions of sufficient difficulty. During the Imperial Manœuvres of 1895 in Pomerania, the German Army made such a trial and, apparently, with complete success.

But before giving an account of it, a brief sketch of military cycling in Germany may be useful.

The new edition of the "Manual of Field Services," dated 20th July, 1894, mentions the cycle for the first time as the organ for transmission of orders.

It recommends the employment of cyclists under the following circumstances—

On the march, to keep up communication between the different parts of the advanced-guard, etc.

On outpost duty, for the transmission of orders and reports.

In cantonment, for postal service.

Lastly, with rear-guards and on lines of communication, where cyclists ought to be made use of so as to avoid any requisitions upon the cavalry squadrons.

The practical utility of the cycle, already proved by the experiences of the grand manœuvres, thus obtained official recognition.

But, up to that time, there had been no official instructions with regard to the recruiting and training of cyclists, their armament, position, etc.

This gap has just been filled by a scheme for the regulation of military cycling, dated 20th May, 1895.

It contains six articles—

1.—A description of the different parts of the machine.
2.—The care to be taken of the machine.
3.—Expenses of maintenance and of replacing.
4.—Control of the machines.
5.—Instruction of the cyclists
6.—Dress, armament and equipment.

Instruction.—In each battalion, the men who are to receive this special instruction are selected by the battalion commander, who takes soldiers of good character, acquainted as far as possible with the use of the bicycle and having a sufficient military training.

The men go through a course of several weeks' duration. At the beginning and end of the first week they are examined by a board of military doctors with regard to their physical constitution and powers of endurance.

The instruction is given by an officer who is a good cyclist and well acquainted with the care of machines, assisted by a certain number of N.-C.O.'s. The course is begun with practice-cycles upon prepared ground and is continued outside as soon as the pupils are sufficiently advanced for the purpose. The duration of the exercises, which is at first from 1½ up to two hours, is gradually extended to four hours at varying rates of speed. When the course of instruction is finished, long rides at great speed are practised, at first upon good level roads, afterwards upon hilly roads, and lastly upon unmade roads. At the same time, the employment of the revolver, when on the march, is practised and also the reading of maps, the examination of ground, and the method of making a report. The military cyclist, when on the march, should be able to read a map or a written order, and to use his revolver.

There are also regulations with regard to dress and equipment. A sword-bayonet is strapped on to the body of the machine and a revolver is carried in the pocket.

It will be seen by this summary that instruction in cycling in the German Army is carried on in a methodical and progressive manner, notwithstanding the preference given to men with some previous knowledge of this exercise. It is thought that, in order to make a good military cyclist it is not enough to know how to manage the machine, but that the very troublesome and delicate service, which will be imposed upon him, day and night, during a campaign, requires special physical and moral qualities, which can only be acquired by a well considered training and education. Constantly left to themselves and out of the way of supervision, military cyclists will not play their part with success, unless they combine with great physical endurance, a strong sense of duty and a careful training.

It may be remarked that the German official documents treating of the bicycle only allude to it as a means of communication; indeed, the armament of the cyclist excludes all idea of joining in the combat. It is probable that the experience gained in the course of the manœuvres of 1895 will mark the point of departure of important modifications, both in the armament of the cyclists and in their employment in the field.

Having stated the condition of military cycling in Germany at the time of the last manœuvres in Pomerania, we will now consider the manner in which cyclists were employed in the army of the north. This army was under the command of General Waldersee, a determined advocate of the employment of the bicycle in the field. In the IX. Corps he formed the greater part of the cyclists into a single detachment under the orders of special officers, and armed them with rifles slung over the shoulder. His object was to make use of their great speed, of their power of travelling long distances in a short time, and of the silence of their march, to assist the cavalry in reconnoitring, to support them in rapidly occupying important posts, in covering columns of infantry, etc., etc. This object was fully attained, especially on the 9th September, as will be shown by the following facts, which we copy from the "Allgemeine Militär Zeitung:"—

The IX. Corps on that day made a forced march to the support of the II. Corps, which was menaced by superior forces and bivouacked at Brietenstein, Rossow and Fahrenwalde, intending to cross the Randow on the morrow to effect a junction with the II. Corps. As the Randow was not fordable, it was of great importance to the Commandant of the IX. Corps to occupy the bridge at Lichnitz on the same day, so as to insure the passage over the river.

As the greater part of the divisional cavalry was attached to the flanking detachment which covered the march of the Army Corps on the right, General Waldersee, in the course of the day, sent forward the cyclist detachment with orders to seize the passage over the Randow at Lichnitz, to join hands with the II. Army Corps and to obtain information with regard to the enemy. This detachment had, therefore, to perform a service generally entrusted to cavalry: namely, to seize an important point with rapidity, to hold it until the arrival of the infantry and to search for the enemy.

The detachment, reaching Lichnitz in the course of the day, occupied it and put the bridge into a state of defence.

A patrol, consisting of an officer with a few cyclists, left Lichnitz in a south-east direction in order to find the enemy. After a run of half-an-hour they discovered them. The patrol rapidly dismounted, the machines were leaned against a tree and several salvoes were fired at the enemy.

The cyclists then remounted and started at a rapid pace across stubbles and cultivated land towards another point of observation. The patrol discharged its mission in a satisfactory manner, and after a two-hours' run, the commanding officer was able to report himself in person at head-quarters.

Certainly, as the German newspaper remarks, there is a limit to the employment of machines when off the roads, but it was not reached in the course of these manœuvres. The cyclists surmounted every difficulty presented by the nature of the country: wood, sands, cultivated ground and even the muddy bottoms of the Randow. In conclusion it may be said that the enemy were never safe with this *iron* cavalry.

This experiment, together with the attention given during the manœuvres to all questions connected with military cycling, seems to indicate that in Germany there is a tendency to develop this service and to make it participate in an effective manner in operations which have hitherto devolved entirely upon the cavalry.

Without sharing the enthusiasm of those who already dream of transforming the cavalry into a cyclist corps, it cannot be denied that the experiments made during these last manœuvres have, in a remarkable manner, enlarged the sphere to which the use of the bicycle in the field had previously been relegated.

Ground will always continue to be an often insurmountable obstacle to machines, which, moreover, would soon become unserviceable if frequently used off the roads.

But the service of reconnoitring and the rapid transmission of orders have

developed to such an extent with modern armies, that they enormously weaken the effective strength of the cavalry and make it absolutely necessary to welcome any means which may aid it in its mission and render it stronger for the actual combat.

It would appear that this part can be advantageously played by detachments of cyclists ably and energetically led. Such means, if placed at the disposal of independent cavalry divisions, by increasing their liberty of action, their security, and their effective power, should lead to results of undeniable importance.

By preceding infantry columns during the march and by patrolling to long distances, both day and night, when they are at the halt, cyclist detachments would assist and, if necessary, might replace the divisional cavalry, which would thus become available for other employment. But duties of this kind ought not to be entrusted to groups thrown together by chance, without cohesion and without special instruction.

The Germans consider it necessary to require other things besides technical skill from military cyclists. Physical and moral qualities and previous practice in cycling should be taken into consideration in the recruiting of cyclists, but it is only by a special course of instruction, carried out in a rational and progressive manner, that they can properly qualify themselves for the active part which they will certainly be called upon to play in the wars of the future.

PRÉCIS
AND
TRANSLATION.

"MILITÄR-WOCHENBLATT."

Non-official part, No. 88, 1896, page 2295.

THE FIRE OF ARTILLERY AT MANŒUVRES.

BY

COLONEL A. E. TURNER, C.B., D.-A.-G., R.A.

"Le feu est tout, l'autre rien."

Some twenty years ago, when the impressions which had been received from the war of 1870–71 were still vivid, and the experiences of fighting against an artillery inferior to our own still fresh, it was the custom of our Field Artillery to take up a position for action at a gallop and without consideration as to concealment from the enemy. The great object was to come into action and open fire with the least possible delay. Theoretically, no doubt, it is indisputable, that such procedure is often dangerous when opposed to modern artillery and may be at times impossible; practically, however, the matter has resolved itself into this, namely, that in the vast majority of cases, the guns are unlimbered under cover in rear of the position, into which they are run up by hand by the detachments slowly and often at the cost of considerable toil and exertion. It is felt that at manœuvres, in order to avoid incurring unfavourable comments at the "critique," it is essential to bring the batteries into action, if possible unseen by the enemy, even at the sacrifice of rapidity in opening fire.

It is indisputable that frequently such method of taking up a position, with a view of engaging in the "artillery duel" with the best prospect of success, has much to commend it. There are cases, however, in which it may be dangerous; for instance, when all the guns of the batteries concerned are not brought simultaneously into some well marked position, which the enemy has noted and is watching. In such a case very little advantage can be gained by taking up a position from under cover, while if the enemy is alert and opens fire on us at once, he will considerably disturb us in so doing, even if he does not make it impossible. How would it fare with us, for instance, if three guns of a battery had been hauled up into the position and left there, while the whole of the detachments were engaged for from three to five minutes in bringing up the remaining three and the enemy opened fire while this was going on?

This method of taking up positions by the artillery would be still more prejudicial in its effects on the army at large, if the enemy's batteries were already

firing effectively at our infantry. What can it profit us to gain the upper hand in the "artillery duel," if our infantry has suffered such losses, that they are no longer in a position to take advantage of it and secure the victory? Even when at most a large proportion of the advanced-guard only is exposed to and shattered by the fire of the enemy's guns, the consequences are by no means inconsiderable, for it must be borne in mind that a single company may turn the balance in favour of their own side. We cannot think for a moment that our artillery in real warfare would, without express command of high authority, allow the guns to be slowly and laboriously dragged into their positions by the detachments when the enemy's shrapnel is already tearing fearful rents in the ranks of their infantry comrades!

Why then should we constantly practise in peace that which, as far as can be seen, will not be to anything like the same extent, the rule in war, and which, at the same time, tends to paralyse the wholesome spirit of initiative; why do we unlearn the important lesson to unlimber dexterously in the position itself; why are the services of our Field Artillery so seriously cramped, that little can be looked for from it; why, in place of judiciously taking advantage of the nature of the ground, should there be a systematic creeping in concealment?

The bottom of all this is, that little or no regard is paid at manœuvres to the effect of artillery fire on the other arms. In real warfare a quick and early appearance of our artillery upon the scene would be followed by the dispersion of the enemy's cavalry and the shattering of the infantry of his advanced-guard, after which we would be prepared under favourable circumstances to engage his guns, when they are brought up, because our artillery will have ascertained with tolerable accuracy on the spot both the errors in range and fuze due to the atmospheric conditions of the day. We must naturally take precautions against being taken by surprise by the enemy's artillery by a careful observation of such points of the ground in front of us, which he is likely to utilise for his guns and also by preparing beforehand a due distribution of our fire. Besides, an artillery which first comes into action gains this incalculable moral advantage, that the men have passed through the phase of nervousness, which affects human nature at the commencement of a battle.

Nothing of this description occurs at manœuvres. No effect is attributed to the fire of the artillery which first comes into action against the enemy's cavalry and infantry and its early arrival is without significance with regard to the battle. Its position is known to the enemy's artillery which, disregarding loss of time, brings up its guns deliberately, carefully and under cover into the most suitable position for combating ours and then fires off its first shot in the "artillery duel." Needless to point out that the artillery which comes latest on the scene can be brought up less exposed to view than its opponent, it can best place its guns in concealed positions and it can arrange its distribution of fire under more favourable conditions than he and accordingly, in nearly all such cases and under such circumstances the umpire will decide that it has gained a preponderance of fire over the enemy

In the war of 1870–71 we constantly directed our fire at the reverse slopes of crests on the supposition that they were occupied by the enemy. We shall no doubt repeat this in future wars; in manœuvres, however, no credit is given for such procedure. This, on the contrary, falls to the share of the artillery which has taken up positions under cover. The circumstance that due regard is not shewn towards the effect of the fire of artillery against the other arms gives rise to further ill-consequences than those above mentioned, for it creates false impressions as to the conditions under which a real battle will be fought. For instance, a manœuvre would last much longer if it were required to carry out turning movements outside the sphere of artillery fire, as would be the case in

real warfare: the defender would be able to hold his position with weaker forces and would be able to bring up his reserves in good time and to the proper place; and the true relation of time to distance would be realised.

It is of the highest importance, not only with regard to the tactics of artillery, but also to those of the other arms that due appreciation of the effect of artillery fire should be shewn throughout manœuvres. This is, we must admit, easier said than done, but "where there is a will there is a way."

It would only be necessary to set up two framed screens in the line of fire of a battery in order to make its direction known far and wide; its objective could also be made well known by making use of different natures of fire against the different arms—thus, if slow fire from a flank signified that artillery was the objective, one round of rapid fire, cavalry, salvos, infantry, many of the present difficulties would disappear and the difficult task of the umpires would be made easier, in spite of the additional duty put upon them.

In conclusion attention must be drawn to other consequences entailed by disregarding the effect of artillery fire; for instance, the frequent premature changes of position by the batteries and the widely circuitous movements made in search of cover, even during the decisive phase of an engagement. So long as artillery moves and does not shoot, it loses in real warfare its fighting value; in manœuvres, on the other hand, no importance is attached to this principle. There can be no question but that this is wrong.

If we attribute even at manœuvres its full fighting effect to the artillery, its movements will be carried out more in conformity with the actual conditions of war.

NOTES

FROM

CORRESPONDING MEMBERS.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

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"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), and (*e*) set in the five examinations ending November 1895:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

Lithographic plates of Field Artillery Harness stripped and laid down for inspection, price for pair (lead and wheel), 1d.

The R.A. Institution have copies of the undermentioned works bound in cloth, which can be bought by members at the price of 1s. each :—

Colonel Walford's Translation of Prince Kraft's Letters on Cavalry.
" " " " " " " " Infantry.

These are the copies as published in Translations with the "Proceedings" and should be useful to members who have joined since the date of their publication.

LIST OF ADDITIONS TO THE LIBRARY AND MUSEUM DURING THE MONTH OF JANUARY 1897.

LIBRARY.

PRESENTED.	BY WHOM.
Instructions for Practice—Siege Artillery, 1897	Secretary of State.
Coloured Lithographs { R.L., No. 236, 238, 239 and 240. R.C.D., No. 237, 241 and 342. R.G.F., No. 161 and 163.	Secretary of State.
Regulations for the Volunteer Force, 1896	Secretary of State.
An Epitome of the Chino-Japanese War, 1894–5	Secretary of State.
Map of the Niger Coast Protectorate and adjacent countries. F.D.W.O., No. 1135	Director of Military Intelligence.
Water-color portrait "Drum-Major Royal Artillery," circa 1860. By Lieutenant R. J. Macdonald, R.A.	Lieutenant Macdonald, R.A.
Short Hand-book of the 15-pr. Field Gun. By Captain J. Headlam, R.A. ...	Captain Headlam, R.A.

PURCHASED.

Oil portrait in gold frame of the *late* General H. Shrapnel, R.A.
Forty-one years in India. 2 Vols. By Field-Marshal Lord Roberts, V.C., etc.
Effect of Maritime Command on Land Campaigns since Waterloo. By Major C. E. Caldwell, R.A.
Journal ou Maréchal de Castellane. Vols. 3, 4 and 5.
Album Militaire. Part IV. 2nd Series.
The Invasion of France in 1814. By M. de Beauchamp. 2 Vols.
Dictionary of Difficulties. Deshumbert.
A Bibliography of Guns and Shooting. By Wirt Gerrare.
History of the British Standing Army 1660–1700. By Clifford Walton, C.B.
Dictionnaire Militaire. Part VIII.
L'Armée Belge. Part VII.
Biologia Centrali—Americana, Archæology. Part VII. Text and Plates.
Zoology. Part CXXXII.
Die Königin Luise. By Von C. Röchling.
Monograph of the Paradiseidæ, or Birds of Paradise, etc. Part VI.

MUSEUM.

PRESENTED.	BY WHOM.
1 frock coat, Colonel-on-the-Staff, R.A.	Colonel W. W. Murdoch, *late* R.A.
1 waistcoat	
1 „ pants	
1 „ jack boots	
1 „ „ spurs	
1 pair cloth overalls	
1 pair Wellington boots	
1 „ spurs	
1 staff shabraque	
1 plume for helmet	
3 collars for patrol	
1 patrol jacket	
1 forage cap	
1 field service cap	
1 gold cross belt and pouch	
1 staff sabretache with slings	
2 gold sword slings for girdle	
1 black silk scarf	
1 pair gloves	
3 collars for frock coat	

The Secretary R.A. Institution has received a small lot of Turkish MSS. suitable for an officer studying for the interpreter's examination ; they are available for use by any member wishing to borrow them.

The R.A. Institution have lately acquired the portraits in oil of two famous artillerymen, viz. : Major-General Shrapnel and Colonel Griffith Williams. The former by Arrowsmith, painted in 1817, was purchased from a descendant of the General whose name and reputation, being world-wide, need no more notice here.

The picture of Colonel Griffith Williams is presented by his nephew C. R. Williams, Esq., of Dolmelynllyn, Dolgelley and most gratefully accepted by the Committee in the name of the Members of the R.A. Institution ; the picture is a half-length, life size painted about the time of Minden to judge by the age ; it is especially valuable as an authentic representation of the uniform of that period ; the Committee are having it thoroughly cleaned and its frame done up so that it may be placed in the prominent position in the Institution building due to so distinguished an officer.

In case there be any who have forgotten the services of Colonel Griffith Williams, the following short memoir will remind them :—

GRIFFITH WILLIAMS.[1]

Listed as Matross in January 1744 in Captain George Michelson's Company, R.A., at Woolwich ; appointed Cadet-Gunner, 4th April, 1744 ; Cadet Company organised, January 1745 and included Griffith Williams ; promoted Lieut.-Fireworker, 6th April, 1745, in Captain Archibald Cunningham's Company ; sent on particular service to America, August 1745 ; promoted 1st Lieutenant, 1st March, 1755 ; in command of detachment, R.A., on Carboniere Island,

[1] Kane's List, No. 131.

Newfoundland, January 1747; remained in Newfoundland in Captain T. Ord's Company until end of January 1751; to England on private leave, 1751 and returned to Newfoundland in January 1753; returned to England, on leave, in January 1759; promoted Capt.-Lieutenant, 1st January, 1759, in Captain Forbes Macbean's Company, R.A., 1st Battalion, and proceeded to Marienveldt, Germany.

Present in the battles of Bergen, 13th April, 1759; Minden, 1st August, 1759 and personally pointed in action the four 14-prs. depicted in all contemporary engravings of the battle; returned to England in January 1760 for the court-martial on Lord George Sackville; promoted Captain on 12th February, 1760 to the company of Miners at Louisbourg, but remained in England (for the court-martial).

He was present at the siege of Belleisle, 1761.

Proceeded to America, on particular service, in command of a detachment; returned to Woolwich, April 1763.

Returned to America in 1776; prisoner of war with the rebels from November 1777 to December 1778; returned to England in January, 1779; promoted Major, 21st March, 1780; Lieut.-Colonel, 9th January, 1782; Colonel, 1st December, 1782.

He commanded the Royal Artillery at part of the siege of Gibraltar, 1782–83.

Colonel-Commandant and commanded the garrison of Woolwich from 20th October, 1783 to February 1786; died at Woolwich, 18th March, 1790.

Married in Newfoundland a daughter of Dr. Jno. Monier, of a Hugenot family, who was in medical charge of the troops in Newfoundland.

His younger brother, George Williams, joined at Woolwich on 1st July, 1761, as a Cadet in the R.A. but did not do duty with the Cadet Company, being at once embarked for America to join the elder brother, Griffith Williams.

Royal Artillery Graves in the Crimea.

It may not be generally known that all the then remaining momuments in the Crimea were collected from the 158 cemeteries, in 1880, and re-erected in the cemetery on Cathcart's Hill.

There, Captain Alexander Murray (*late* Gordon Highlanders) makes it his duty to see to their preservation and repair.

In a letter I recently received from him, he says "All the artillery momuments are in good order." This may be of interest to the Regiment, and particularly so to the senior officers.

It may be fairly said that to Captain Murray, the army owes a debt of gratitude for the interest and care he bestows on Cathcart's Hill.

F.M.L.

R.A. GAMES' FUND.

To the Hon. Sec. R.A. Games' Fund.

Dear Sir,

In your report on the R.A. Games' Fund, you state that the original fund was started about 1874. The facts are these:—

In 1878, when I was Captain of the Riding Establishment, with the sanction of General R. P. Radcliff, (then D.A.G.), I formed a working committee to organize a Games' Fund. The names of the members of the committee I forget, but General King and Major Ward Ashton were on it, and the former was my strongest supporter. I acted as secretary and was commissioned to

purchase the two challenge cups, one of which was paid for by the Royal Engineers, and the first matches were played at Woolwich in the same year.

The list of subscribers to the fund increased rapidly, and when I left Woolwich in 1879, there were from 200 to 300 names on it. I was appointed to the command of a battery at Horfield, and I observe the first donation from the fund was made on my application. It was the opinion of many officers that the fund would never do more than provide for the expenses of the matches, and any prospectus, in which a very much wider scope of usefulness was comtemplated, was regarded as ambitious and visionary. The pamphlet you have circulated shows that I was not unduly sanguine as to the ultimate success of the undertaking. Exception was also taken to the low scale of subscriptions, which it was contended would not produce sufficient money to pay the calls; but I believed that a small subscription would induce many to join who would have hesitated to pay a larger one. As the scale now is, I believe, the same as that introduced in 1878, my forecast seems to have been correct.

Yours truly,
T. B. TYLER.

CORK.

THE CENTENARY CUP, 1896.

In consequence of the Centenary Cup having been won in 1896 by No. 1 Company, Southern Division, R.A., Cork Harbour, Colonel E. H. Holley, Colonel-on-the-Staff, C.R.A., Cork District, held a parade of the R.A., Cork Harbour, on Tuesday, 5th December, for the purpose of congratulating Major C. A. Howard, R.A., and the officers and men of No. 1 Company on their achievement in winning the cup the first year it has been offered for competition by Garrison Artillery.

In the course of his speech, Colonel Holley pointed out the fact that actual hits only counted towards the figure of merit, that there were many difficulties in the way of practice and previous drill in Cork Harbour not shared by many other competing stations, that a towed target had been used for the first time in Cork Harbour and also that the exceptionally rough weather in which the practice was carried out enhanced to a considerable degree the value of the fine performance of Major Howard's Company. In conclusion, he hoped that the cup would return to Cork Harbour in 1898, when next competed for by Garrison Artillery.

The cup, which is a very handsome one of silver, standing some two feet high, is surmounted by a figure representing an officer in the dress of 1795, with panels in relief representing Horse, Field and Garrison Artillery at work, was placed on a table in the centre of a hollow square formed by the three companies, Cork Harbour, and was afterwards deposited in the Officers' Mess, Fort Westmoreland, where it remains for one year.

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"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), and (*e*) set in the five examinations ending November 1895:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

Lithographic plates of Field Artillery Harness stripped and laid down for inspection, price for pair (lead and wheel), 1d.

THE R.A. Institution have copies of the undermentioned works bound in cloth, which can be bought by members at the price of 1s. each:—

Colonel Walford's Translation of Prince Kraft's Letters on Cavalry.
" " " " " " " Infantry.

These are the copies as published in Translations with the "Proceedings" and should be useful to members who have joined since the date of their publication.

LIST OF ADDITIONS TO THE LIBRARY DURING THE MONTH OF FEBRUARY, 1897.

PRESENTED.	BY WHOM.
Description of a series of figures in armour in the Rotunda Museum, Woolwich, by Captain C. Orde-Browne (*late* R.A.). ...	I. G. of Ordnance.
Arrangements for the supply of ammunition, targets, and other stores, for the practice of Royal Horse and Field Artillery in Ireland, for the year 1897....	Secretary of State.
Arrangements for the supply of ammunition, targets and other stores, for the practice of Royal Horse and Field Artillery in Great Britain, for the year 1897.	
Annual Report of the Superintendent of the United States Military Academy.	Secretary War Department, United States.
Map of the South African Republic and adjoining territories. I.D.W.O. No. 1159.	Director of Military Intelligence.
Netherlands Artillery Atlas, Nos. 234 to 239.	Netherlands Government.
Journal of the Iron and Steel Institute, No. 2, 1896.	The Council.
Facsimile of letter of Scharnhorst, dated 27th May, 1813.	Poultney Bigelow, Esq.
Copy of Schlefifche Privilegirte Beitung, No. 34, dated 20th March 1813.	
Photograph of page of Schildăn church book, shewing entry in regard to baptism of Field-Marshal Gneisenan.	

PURCHASED.

Questionnaire pour les instructions intérieures dans les batteries d'artillerie.
Une famille militaire au XVIII.e siecle. Baron J. Du Teil.
L'Armée Belge. Part 8.
Traité théorique et pratique des matières explosives. By Léon Gody. 2nd Ed., 1896.
Note sur les formations et les procédés de combat des infanteries étrangères. By E. Rollin.
Fünf taktische aufgaben über führung und verwendung der Feld-Artillerie. By Gustav Smekal. Part 1.
Kriegsgeschichtliche Beispiele aus dem deutsch-französischen-kriege, 1870-71. Von Kunz, Major a.D. Parts 1 and 2.
Photographs of French war ships, "Carnot" and "Foudre."
Original Verpackung zu C. Röchling, Unser Heer.
The battlefields of Germany. By Col. G. B. Malleson, C.S.I.
Malcolm's history of Persia. By Lieut.-Col. M. H. Court.
Army estimates, 1897-98.
Farthest north. By Dr. Fridtjof Nansen. Vols. 1 and 2.

The following are the descriptions of the twelve figures of men in armour devised and arranged in the Rotunda Museum by Captain C. Orde Browne, late R.A.; each description will be fixed in front of its own figure on the hand rail enclosing the collection.

Captain Orde Browne prepared a longer description in book form which he illustrated with very clever water-colour sketches of each figure and forwarded through the Committee of the R.A. Institution to the I.G.O. This was submitted to the Secretary of State for War who expressed the highest approval of its artistic and historical merits and who directed it to be suitably bound and deposited in the R.A. Institution.

It is very satisfactory to think that through the knowledge and exertions of an Artillery officer the Rotunda Museum now possesses a collection which does justice to the many valuable specimens of armour secured for it in former days by such famous Artillerymen as Colquhoun and Lefroy who could not but have been pleased to see the various articles they picked up in different parts of the world so cleverly assembled.

Late 13th or early 14th century.

Figure A.

Knight in chain mail (equipment imperfect.)

14th or early 15th century.

Figure B.

Gunner or bombardier in mail shirt, firing stone shot from a 15-in. bombard. He ignites the charge with a hot iron, guarding his face with his left hand from the sparks thrown off by the old-fashioned powder.

This is the earliest class of gun.

15th century.

Figure C.

Archer watching the flight of an arrow discharged from his long bow.

This is believed to be earliest archer's equipment extant (resembling that in use at Agincourt,) the arms and chest are left unarmoured for greater freedom. The sheaf of arrows in use would be stuck in the ground or held under the left foot

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15th century.

Figure D.

Cross-bowman winding up a small cross-bow with a "moulinet," or winch. He wears, besides his half plates, a "brigandine" or stuff tunic lined with strips of steel.

15th century.

Figure E.

Knight in cap-à-pie plate armour. The equipment is imperfect. The "sollerets" and "tuiles," or pieces on feet and groins, are roughly made to complete the figure. This nearly resembles the equipment used in the "Wars of the Roses."

Beginning of 16th century.

Figure F.

Mounted knight in cap-à-pie plate armour. This suit, Meyrick says, was attributed to the Chevalier Bayard, but on what ground cannot be now ascertained. It closely resembles the armour in which Bayard is generally depicted. Armour of this style was worn at Flodden Field.

N.B.—The wooden horse was copied from the Duke of Wellington's horse "Copenhagen."

16th century.

Figure G.

Infantry soldier in half suit of plate, discharging a matchlock on a prop. The match is lit at each end. In the first "hand guns," the man held the match in his fingers and had to find his way to the touch hole while he took aim. In this piece, the match is brought down by a serpentine worked by a trigger. This then is the second stage of hand gun.

Early 17th century.

Figure H.

Knight of the time of Charles I.
The plate ends at the knees in so-called "lobster tail."

17th century.

Figure I.

Pikeman with 18-foot pike.

17th century.

Figure J.

Light horseman equipment of the time of the great Rebellion.
He is dismounted and "at bay," aiming a wheel lock pistol, his sword being held ready to seize, between his left finger and thumb. His breastplate is bullet proof and has been struck once. He wears one long gauntlet on his left hand. Here is a fire-arm manageable with one hand.

Late 17th century.

Figure K.

Infantry soldier cocking a flint lock musket. This lock came in a little before the disappearance of armour and continued in use until long after Waterloo.

THE ROYAL ARTILLERY MEETING, 1897,

WILL TAKE PLACE AT

ALDERSHOT

ON

SATURDAY, APRIL 24TH

BY PERMISSION OF

General H.R.H. the DUKE of CONNAUGHT, K.G., K.C.B., &c., &c.
Commanding Aldershot Division.

(UNDER NATIONAL HUNT RULES).

STEWARDS:

MAJOR-GENERAL J. ALLEYNE, C.B., R.A.
LIEUT.-COLONEL F. W. J. EUSTACE, R.H.A.
MAJOR A. H. CARTER, R.A.
MAJOR C. F. BLANE, R.A.
CAPTAIN H. L. POWELL, R.A.

Clerk of the Course & Stakeholder ... ... COLONEL S. H. TOOGOOD.
Clerk of the Scales, Judge and Handicapper ... ... MR. R. I'ANSON.
Starter ... ...MR. H. REDFORD.

R.A. REGIMENTAL RACES.

***No Officer will be qualified to enter or ride horses in the regimental races who is not a subscriber of at least 1 sov. to the Race-fund.

The Royal Artillery Gold Cup value **100** sovs., with **50** sovs. to the winner, **20** sovs. to the second, and **10** sovs. to the third; for horses five-years-old and upwards, the property of, and to be ridden by, Officers on full or half-pay of the Royal Artillery, that have never won a steeplechase value 90 sovs., and have been regularly hunted during the past season by their nominators, or by some other Officer qualified to enter; 12 st. each; the winner of a steeplechase under 50 sovs. in value to carry 7 lb. extra, of two or more such races, or of one or more steeplechases value 50 sovs. to carry 14 lb. extra; no penalties for winners of regimental races; entrance 2 sovs., but starters free except the winner; three miles.

Ten entries or the race may be declared void.

To close on Tuesday, April 6th, to Messrs. Weatherby, Messrs. Pratt & Co., or Colonel Toogood, Denham Court, Winchester.

The Welter Steeplechase of **50** sovs., with **10** sovs. to the second,

and **5** sovs. to the third ; for horses five-years-old and upwards (not thoroughbred), the property of, and to be ridden by, Officers on full or half-pay of the Royal Artillery, or Officers who have retired from the Regiment, which have been regularly hunted during the past season by their nominators, or by some other Officer qualified to enter, and have never won a race of any description ; 13 st. 7 lb each ; horses not ridden by their owners to carry 7 lb. extra ; entrance 1 sov., but starters free except the winner ; two miles and five furlongs.

Ten entries, or the race may be declared void.

To close as above on Tuesday, April 6th.

The Light Weight Steeplechase of **50** sovs., with **10** sovs. to the second, and **5** sovs. to the third ; for horses five-years-old and upwards, the property of, and to be ridden by, Officers on full or half-pay of the Royal Artillery, which have been regularly hunted during the past season by their nominators, or by some other Officer qualified to enter, and have never won a race of any description ; 11 st. 7 lb. each ; entrance 1 sov., but starters free except the winner ; two miles and five furlongs.

Ten entries, or the race may be declared void.

To close as above on Tuesday, April 6th.

***In the above three races, the Stewards reserve to themselves the right to refuse the entry of any horse that, in their opinion, has not been regularly and fairly hunted.

A Consolation Steeplechase of **25** sovs. to the winner, and 5 sovs. to the second, for beaten horses in the regimental races ; 12st. each ; post entrance free ; two miles.

INDIAN SMALL GAME.

Having spent a good number of years in India, it struck me that it might be useful to young officers going out there to read these few lines. Within reasonable distance of most stations sport of some sort is sure to be obtainable and with a little judicious questioning of natives or brother officers its whereabouts can generally be found. Native shikarees are very seldom reliable but occasionally excellent men can be picked up. Agreement should always be made beforehand that pay will be in proportion to the amount of game shown. As soon as possible learn something of the language, as a great deal is obtained only after questioning of villagers on your part or on the part of your shikaree. You will generally find natives shy of giving information at first, but by paying them well and gaining their confidence you will find them very useful. A map of the country, which can be obtained from Thacker & Co., Bombay or Calcutta, is indispensable. As regards small game the following may be found useful :—

Ducks and Snipe.—These come in during November and are found on nearly all "tanks," not very close to cantonments during the cold weather. Ducks are of great variety, from the small cotton teal to the mallard and often a half a dozen different sorts are found on the same tank. If they have not been much shot at, you will find that a good many can be picked up from the edge, but they will soon get wild and settle in the middle or leave for other haunts. The early morning and evening are the best times to go after them, as they settle and feed during the night in the reeds at the edge. A portable boat is most useful, especially in large tanks. Return to breakfast and bang at the snipe when the sun has got tolerably warm, as they are not then so wild and lie closer. Towards evening the ducks begin to return and numbers can be picked up as they swing in to their feeding grounds. For duck best shot are No. 3 or 4 and for snipe 8 or 10.

Partridges.—There are several descriptions, the grey and painted are the most common. The former are found in rough scrub jungle. The latter is a beautiful bird and is recognisable by its shrill cry heard in the grain fields when they come out to feed in the evening. They are picked up in all sorts of places, nullahs, grass and bushes. No. 6 shot for both.

Sand Grouse.—There are many varieties—the imperial in the north, common, pin tail, etc. They fly in flocks, except when pairing, and give very good sport, are usually found on sandy or rocky soil and always fly with a peculiar shrill metallic cry, which can be heard at great distances. During the hot weather when there is not much water they can be got very often by waiting at some pool as they drink about the same time every day, *i.e.* between 8 and 10 a.m.

Quail.—There are four kinds—rain, grey, painted and bush. After the monsoon has set in rain quail are to be found in cotton fields and long grass, a call bird *i.e.* (a tame quail in a wicker cage) put into a field will soon attract others to it. Grey quail are found in all seasons in grass or thick scrub; painted also. No. 10 shot is the best for them.

Hares are found on the borders of fields, thick grass or bushes and also on low bushy hills. They are very large and take a good deal of killing. No. 6 is the best shot for them.

Bustard.—The great Indian bustard is rare and difficult to get. They are very wary and take all one's ingenuity to get the better of them. They are found in wheat and cotton fields. I think one is justified in using a country cart in approaching them as they are so rarely seen. By this means you can approach quite close, circling round until you are within range. They can be shot either with a rook rifle or No. 1 shot. They take a long time to rise and fly at what appears a slow rate, but they are really going much faster than one would think. I have once mistaken one for a black buck, they are so large. They are called "home" by the natives from the cry they make. Having got "kubber" of them send out your shikaree to mark them down before you go out yourself.

Florican.—They are not plentiful and are very wary, running a long distance after alighting and are difficult to put up. No. 6 shot is sufficient for them.

Black Buck.—Found over the greater part of India in great numbers and if not much shot at are easy to get. Stalking, except for those that are very wild, is a mistake. You should walk up naturally to them, plucking grass as you approach and only occasionally looking in their direction, move in a circle round them and gradually get nearer. They take a lot of killing and will go for miles with a leg broken or entrails protruding. Look for them in gram or wheat fields in the cold weather.

Chikara.—A beautiful small gazelle found on the outskirts of ranges of hills, they are shy and a small mark in the distance. I have found the most successful plan is to follow them till they disappear over a small hill, then run as hard as possible to the top when they will generally be found quietly feeding in the valley below, having stopped as soon as you were out of sight.

Weapons.—The following is a good battery for the plains for small game and antelope:—

12 bore (left barrel choke) D.B. by good maker.
·500 D.B. Express, by Holland & Holland. The 500 is perhaps a little heavy for antelope, but it can be used for big game also.
Rook Rifle by Holland. Good for chikara.

You can get the battery probably in India second hand from advertisements in the *Pioneer*.

You want a good "solah topi" and a wadded covering for the back and shoulders, khaki shikar clothes with lots of pockets and rifle cartridge holders on either side of the breast, putties that will resist spear grass and heavy ammuni-

tion boots, a good belt with knife, Cabul tent and camp furniture, also field glasses and felt-covered water-bottle. If you protect your head and shoulders well from the sun you can shoot through hot or cold weather and never feel sick or sorry.

Medicines required when going out for any length of time—quinine, chlorodyne and carbolic acid.

The best means of preserving skins is to peg them out in shade and rub in arsenical soap and wood ashes and leave to dry.

Pay for beaters four annas a day, they can always be got from the head man of any village. Treat the native well, pay him well and don't bully him; if you do the latter you will get nothing out of him. Supplies such as eggs, wood, chickens and vegetables can always be got from the head man in the village at rates fixed by the Deputy Commissioner.

OBITUARY.

Major-General R. B. McCrea (retired), died at Ewell, Surrey, on 11th Feb., 1897. He was first commissioned as 2nd Lieutenant, 18th June, 1842; became Lieutenant, 4th April, 1843; 2nd Captain, 28th November, 1848; Captain, 28th November, 1854; Major, 8th April, 1859; Lieut.-Colonel, 22nd February, 1863; Colonel, 22nd February, 1868, and retired on full pay with hon. rank of Major-General, 4th February, 1874. Major-General McCrea commanded, as a Captain, three batteries of Royal Artillery and a detachment of the 41st Regiment during the revolution in Hayti in 1859; he landed and protected the Europeans at Port-au-Prince, carried off the Emperor, his family and ministers. For these services he received the thanks of the English and French Governments and the brevet of Major.

Lieutenant A. A. Boggs, who died at Trimulgherry on 15th February, 1897, was first commissioned as 2nd Lieutenant, 15th February, 1889 and became Lieutenant, 16th February, 1892.

By the death of Sergeant-Major A. E. Bryant, R.A., on the 6th February, 1897, the members of this Institution have lost one who had faithfully served them for nearly 35 years.

He joined the Institution as a Clerk, when a Bombardier, in May 1862; became Superintending Clerk in 1868 and was granted the rank of Sergeant-Major in 1871.

Owing to the weakness of his eyesight the Committee recently offered him an addition to his military pension. He had only left the Institution building five days to commence as was hoped a long period of well earned rest when he died very suddenly from failure of the action of the heart. He was buried with military honours in Charlton cemetery on the 10th February as his discharge to pension had not been completed.

DIARY OF FIXTURES.

MARCH.

Day of the Mth	Wk	Regimental.	Cricket, &c.	Private.
1	M	... ...	... ...	... ...
2	T	... ...	... ...	... ...
3	W	... ...	... ...	... ...
4	Th	... ...	... ...	... ...
5	F	... ...	... ...	... ...
6	S	... ...	... ...	... ...
7	**S**	... ...	... ...	... ...
8	M	... ...	... ...	... ...
9	T	... ...	... ...	... ...
10	W	R.A. Band Concert at 3 p.m.	... ...	... ...
11	Th	Lecture at R.A.I. by Captain E. H. Hills, R.E. on The Solar Eclipse, 1898.		
12	F	... ...	... ...	... ...
13	S	... ...	... ...	... ...
14	**S**	... ...	... ...	... ...
15	M	... ...	... ...	... ...
16	T	... ...	... ...	... ...
17	W	R.A. Band Concert at 3 p.m.	... ...	... ...
18	Th	Lecture at R.A.I. at 5 p.m. by Major-General Sir W. F. Butler, K.C.B., on 'The Nile Cataracts.'	... ...	... ...
19	F	... ...	... ...	... ...
20	S	... ...	... ...	... ...
21	**S**	... ...	... ...	... ...
22	M	... ...	... ...	... ...
23	T	... ...	Lincoln Races begin.	... ...
24	W	R.A. Band Concert at 3 p.m.	... ...	... ...
25	Th	... ...	Liverpool Races begin.	... ...
26	F	R.A. Band Concert in London at 3 p.m.	Grand National.	... ...
27	S	... ...	... ...	... ...
28	**S**	... ...	... ...	... ...
29	M	... ...	... ...	... ...
30	T	... ...	... ...	... ...
31	W	R.A. Band Concert at 9 p.m.	... ...	... ...

APRIL.

1	Th	... ...	... ...	... ...
2	F	... ...	R.A. *v.* R.E. Rackets and Billiards at Woolwich.	... ...
3	S	Long Course joins at Shoebury.	R.A. *v.* R.E. Rackets and Billiards at Woolwich.	... ...
4	**S**	... ...	... ...	... ...
5	M	... ...	... ...	... ...
6	T	... ...	... ...	... ...
7	W	R.A. Band Concert at 3 p.m.	... . .	... ...
8	Th	... ...	... ...	... ...
9	F	... ...	... ...	... . .
10	S	... ...	... ...	... ...
11	**S**	... ...	... ...	... ...
12	M	... ...	... ...	... ...
13	T	... ...	... ...	... ...
14	W	... ...	... ...	.. ...
15	T	Firemaster's Course begins.	... ...	... ...
16	F	Good Friday.	... ...	... ...

APRIL.—*Continued.*

Day of the Mth	Wk.	Regimental.	Cricket, &c,	Private.
17	S	... ...	... ...	... ...
18	**S**	Easter Day.	... ...	... ...
19	M	Bank Holiday.	... ...	... ...
20	T	... ...	... ...	... ...
21	W	... ...	Newmarket Craven Meeting begins.	... ...
22	Th	... ...	... ...	... ...
23	F	... ...	... ...	... ...
24	S	... ...	Royal Artillery Races at Aldershot.	... ...
25	**S**	... ...	... ...	... ...
26	M	... ...	... ...	... ...
27	T	... ...	... ...	... ...
28	W	... ...	R.A *v.* R.E. Golf Matches at Sandwich.*	... ...
29	Th	... ...	... ...	... ...
30	F	R.A. Band Concert in London at 3 p.m.	... ...	... ...

MAY.

1	S	1st Division (F.A. Hilsea) reaches Okehampton. 1st Division (R.H.A. mixed) reaches Shoebury.	... ...	... ...
2	**S**	... ...	... ...	... ...
3	M	Position Finding Course begins.	... ...	... ...
4	T	... ...	Newmarket 1st Spring begins.	... ...
5	W	... ...	... ...	... ...
6	Th	... ...	... ...	... ...
7	F	... ...	... ...	... ...
8	S	2nd Division (F.A. Aldershot) reaches Shoebury.	... ...	... ...
9	**S**	... ...	... ...	... ...
10	M	... ...	... ...	... ...
11	T	... ...	... ...	... ...
12	W	... ...	... ...	... ...
13	Th	... ...	... ...	... ...
14	F	Royal Artillery Ball at Woolwich.*	... ...	... ...
15	S	2nd Division (R.H.A. Aldershot) reaches Okehampton. 3rd Division (F.A. Aldershot) reaches Shoebury.	Kempton Park Jubilee Stakes	... ...
16	**S**	... ...	... ...	... ...
17	M	... ...	... ...	... ...
18	T	... ...	Newmarket 2nd Spring begins.	... ...
19	W	... ...	... ...	... ...
20	Th	... ...	... ...	... ...
21	F	... ...	... ...	... ...
22	S	4th Division (R.H.A. Woolwich) reaches Shoebury.	... ...	... ...
23	**S**	... ...	... ...	... ...
24	M	... ...	... ...	... ...
25	T	... ...	... ...	... ...
26	W	... ...	R.A. *v.* Aldershot at Aldershot.	... ...
27	Th	... ...	R.A. *v.* Aldershot at Aldershot.	... ...
28	F	... ...	... ...	... ...
29	S	5th Division (F.A. mixed) reaches Shoebury.	... ...	... ...
30	**S**	... ...	... ...	... ...
31	M	... ...	... ...	... ...

*Probable date.

JUNE.

Day of the Mth	Wk	Regimental.	Cricket, &c.	Private.
1	T	... ...	Epsom Summer Meeting begins.	... ...
2	W	... ...	Derby.	... ...
3	Th	... ...	... ...	... ...
4	F	... ...	Oaks.	... ...
5	S	... ...	... ...	... ...
6	S	Whit-Sunday.	... ...	... ...
7	M	Bank Holiday.	... ...	... ...
8	T	... ...	... ...	... ...
9	W	... ...	... ...	... ...
10	Th	3rd Division (F.A. Woolwich) reaches Okehampton.	... ...	... ...
11	F	Annual General Meeting of R.A.I. at R.U.S.I at 3 p.m	REGIMENTAL DINNER. R.A. *v.* Eton Ramblers at Woolwich.	... ...
12	S	7th Division (F.A., Woolwich) reaches Shoebury.	R.A. v. Eton Ramblers at Woolwich.	... ...
13	S	... ...	... ...	... ...
14	M	... ...	... ...	... ...
15	T	... ...	Ascot begins.	... ...
16	W	... ...	... ...	... ...
17	Th	... ...	... ...	... ...
18	F	... ...	R.A. v. R.E. at Woolwich.	... ...
19	S	... ...	R.A. v. R.E. at Woolwich.	... ...
20	S	... ...	... ...	... ...
21	M	... ...	... ...	... ...
22	T	... ...	... ...	... ...
23	W	... ...	... ...	... ...
24	Th	... ...	R.A. v. M.C.C. at Lord's.	... ...
25	F	... ...	R.A. v. M.C.C. at Lord's.	... ...
26	S	1st Division (F.A. Newcastle) reaches Church Stretton.	... ...	... ...
27	S	... ...	... ...	... ...
28	M	... ...	... ...	... ...
29	T	... ...	Newmarket 1st July begins.	... ...
30	W	... ..	R.A. v. Yorkshire Gentlemen at Woolwich.	... ...

C. G. Mackenzie, R.A., Hon. Secretary. *Judge:* Lieut.-Col. F. J. Eustace, R.H.A. *Starter:* G. Darby, Esq. *Clerk of the Scales:* J. Darby, Esq.

This meeting was again a great success notwithstanding the attraction of the House of Commons' and Inter-regimental Guards' Brigade Point-to-Point the same day. It is hoped that it may now be considered to have safely negociated its initial difficulties and take rank as an annual Regimental fixture.

R.A. POINT-TO-POINT LIGHT WEIGHT RACE. Catch weights over 12st. Run at 12 noon. :—

Capt. C. Goulburn's b.g. PRINCE, aged	1
Mr. J. C. Hankey's b.m. JINNEY, aged	2
Capt. C. G. Mackenzie's ch. g. MR. CAUDLE, 6 years	3
Capt. F. Wing's b.m. ROSA, aged	4
Capt. H. N. Schofield's br. g. MOUNTAINEER, aged	5
Major W. Paget's b. g. NEMESIS, aged	6
Capt. H. M. Ferrar's ch. g. ROCK-FIELD, 5 years	0
Mr. G. Baillie's ch. m. KENDALINE, 6 years	0
Mr. H. Davson's ch. g. KILLEEN, aged	0
Mr. A. G. Arbuthnot's ch. m. LEILA, aged	0
Hon. G. Stanley's b. g. FROSTBITE, aged	0
Hon. G. Stanley's b. g. STRUCKILE, aged	0
Mr. A. Hobson's ch. g. SIDDINGTON II., aged	0
Mr. M. Courage's gr. g. THORNDON, aged	0

R.A. POINT-TO-POINT HEAVY WEIGHT RACE. Catch weights over 13st. 7lb. Run at 12.45. :—

Capt. H. N. Schofield's br. g. ROYALIST, 6 years	1
Hon. G. Stanley's b. g. GENERAL, aged	2
Major W. Darby's br. g. GOSSOON, aged	3
Mr. M. Courage's b. g. BALLYHOOLEY, aged	0
Hon. G. Stanley's br. g. STILTON, aged	0
Capt. C. G. Mackenzie's b. g. SPIDER, aged	0
Capt. C. G. Mackenzie's ch. g. SHELL-OUT, aged	0
Mr. V. Hine-Haycock's b. g. CZAR, aged	0

There was also a Farmer's Race for which there were no less than eighteen entries.

Obituary.

LIEUT.-COLONEL C. E. B. LEACOCK (retired) died at Florence on 12th March 1897. He joined the Regiment as Lieutenant, 21st December, 1859; became 2nd Captain, 23rd December, 1871; Captain, 5th July, 1872; Major, 27th August, 1879; Lieut.-Colonel, 7th September, 1886 and retired on retired pay 4th January, 1890. Lieut.-Colonel Leacock served in the Abyssinian Expedition 1867–8 and was present at the fall of Magdala (medal).

CAPTAIN W. PHILLIPS, who died at Malta on the 15th March, 1897, was commissioned from the ranks as Lieutenant, 19th September, 1885 and became Captain, 2nd September, 1891.

LIEUTENANT H. G. F. GEARY, eldest son of Maj.-Genl. H. Le G. Geary, C.B., who died of cholera at Jubbulpore on 23rd March, 1897, was first commissioned as 2nd Lieutenant, 15th February, 1889 and became Lieutenant, 15th February, 1892.

DIARY OF FIXTURES.

APRIL.

Day of the Mth.	Wk.	Regimental.	Cricket &c.	Private.
1	Th	... ...	... ...	... ...
2	F	... ...	R.A. *v.* R.E. Rackets and Billiards at Woolwich.	... ...
3	S	Long Course joins at Shoebury.	R.A. *v.* R.E. Rackets and Billiards at Woolwich. University Boat Race.	... ...
4	S	... ...	... ...	... ...
5	M	... ...	... ...	... ...
6	T	... ...	... ...	... ...
7	W	R.A. Band Concert at 3 p.m.	... ...	... ...
8	Th	... ...	... ...	... ...
9	F	... ...	... ...	... ...
10	S	... ...	... ...	... ...
11	S	... ...	... ...	... ...
12	M	... ...	... ...	... ...
13	T	... ...	... ...	... ...
14	W	... ...	... ...	... ...
15	T	Firemaster's Course begins.	... ...	... ...
16	F	Good Friday.	... ...	... ...
17	S	... ...	... ...	... ...
18	S	Easter Day.	... ...	... ...
19	M	Bank Holiday.	... ...	... ...
20	T	... ...	... ...	... ...
21	W	... ...	Newmarket Craven Meeting begins.	... ...
22	Th	... ...	... ...	... ...
23	F	R.A. Band Concert in London at 3 p.m.	... ...	... ...
24	S	... ...	Royal Artillery Races at Aldershot.	... ...
25	S	... ...	... ...	... ...
26	M	Militia Course at Golden Hill begins.	... ...	... ...
27	T	... ...	R.A *v.* R.E. Golf Matches at Sandwich.	... ...
28	W	... ...	... ...	... ...
29	Th	... ...	... ...	... ...
30	F	... ...	... ...	... ...

MAY.

1	S	1st Division (F.A. Hilsea) reaches Okehampton. 1st Division (R.H.A. mixed) reaches Shoebury.	... ...	... ...
2	S	... ...	... ...	... ...
3	M	Position Finding Course begins.	... ...	... ...
4	T	... ...	Newmarket 1st Spring begins.	... ...
5	W	... ...	... ...	... ...
6	Th	... ...	... ...	... ...
7	F	... ...	... ...	... ...
8	S	2nd Division (F.A. Aldershot) reaches Shoebury. 1st Division Course at Golden Hill begins.	... ...	... ...
9	S	... ...	... ...	... ...
10	M	Woolwich week begins.	... ...	... ...
11	T	... ...	... ...	... ...
12	W	... ...	... ...	... ...
13	Th	... ...	... ...	... ...
14	F	Royal Artillery Ball at Woolwich.	... ...	... ...

MAY.—*Continued.*

Day of the

Mth.	Wk.	Regimental.	Cricket, &c.	Private.
15	S	2nd Division (R.H.A. Aldershot) reaches Okehampton. 3rd Division (F.A. Aldershot) reaches Shoebury.	Kempton Park Jubilee Stakes	... ...
16	S	... ...	... ...	... ...
17	M	... ...	... ...	... ...
18	T	... ...	Newmarket 2nd Spring begins.	... ...
19	W	... ...	... ...	... ...
20	Th	... ...	... ...	... ...
21	F	... ...	... ...	... ...
22	S	4th Division (R.H.A. Woolwich) reaches Shoebury.	... ...	... ...
23	S	... ...	... ...	... ...
24	M	... ...	... ...	... ...
25	T	... ...	... ...	... ...
26	W	... ...	R.A. *v.* Aldershot at Aldershot.	... ...
27	Th	... ...	R.A. *v.* Aldershot at Aldershot. Military Tournament begins.	... ...
28	F	... ...	... ...	... ...
29	S	5th Division (F.A. mixed) reaches Shoebury. 2nd Division Course at Golden Hill begins.	... ...	... ...
30	S	... ...	... ...	... ...
31	M	... ...	... ...	... ...

JUNE.

1	T	... ...	Epsom SummerMeetinge begins.	... ...
2	W	... ...	Derby.	... ...
3	Th	... ...	... ...	... ...
4	F	... ...	Oaks.	... ...
5	S	6th Division (F.A. Weedon) reaches Shoebury.	... ...	... ...
6	S	Whit-Sunday.	... ...	... ...
7	M	Bank Holiday.	... ...	... ...
8	T	... ...	... ...	... ...
9	W	... ...	... ...	... ...
10	Th	... ...	... ...	... ...
11	F	Annual General Meeting of R.A.I. at R.U.S.I. at 3 p.m.	REGIMENTAL DINNER. R.A. *v.* Eton Ramblers at Woolwich.	... ...
12	S	7th Division (F.A., Woolwich) reaches Shoebury.	R.A. v. Eton Ramblers at Woolwich.	... ...
13	S	... ...	... ...	... ...
14	M	... ...	... ...	... ...
15	T	... ...	Ascot begins.	... ...
16	W	... ...	... ...	... ...
17	Th	... ...	... ...	... ...
18	F	... ...	R.A. v. R.E. at Woolwich.	... ...
19	S	3rd Division Course at Golden Hill begins.	R.A. v. R.E. at Woolwich.	... ...
20	S	... ...	... ...	... ...
21	M	... ...	... ...	... ...
22	T	JUBILEE CELEBRATION.		... ...
23	W	... ...	... ...	... ...
		... ...	... ...	... ...
24	Th	... ...	R.A. v. M.C.C. at Lord's.	... ...
25	F	... ...	R.A. v. M.C.C. at Lord's.	... ...
26	S	1st Division (F.A. Newcastle) reaches Church Stretton.	... ...	... ...
27	S	... ...	... ...	... ...
28	M	... ...	... ...	... ...
29	T	3rd Division (F.A. Woolwich) reaches Okehampton.	Newmarket 1st July begins.	... ...
30	W	... ...	R.A. v. Yorkshire Gentlemen at Woolwich.	... ...

JULY.

Day of the Mth.	Wk.	Regimental.	Cricket, &c.	Private.
1	Th	... ...	R.A. *v.* Yorkshire Gentlemen at Woolwich.	
2	F	... ...	R.A. *v.* Household Brigade at Chelsea.	... ...
3	S	... ...	R.A. *v.* Household Brigade at Chelsea.	.. ...
4	**S**	... ...	... ...	... ...
5	M	... ...	... ...	... ...
6	T	... ...	Stockbridge Races begins.	... ...
7	W	4th Division (F.A. Exeter) reaches Okehampton.	... ...	... ...
8	Th	... ...	... ...	... ...
9	F	... ...	R.A. *v.* B.B. at Woolwich.	... ...
10	S	4th Division Course at Golden Hill begins.	R.A. *v.* B.B. at Woolwich.	... ...
11	**S**	... ...	... ...	... ...
12	M	... ...	R.A. *v.* Harlequins at Woolwich.	... ...
13	T	... ...	R.A. *v.* Harlequins at Woolwich. Newmarket 2nd July begins.	... ...
14	W	... ...	... ...	... ...
15	Th	... ...	... ...	... ...
16	F	... ...	Sandown Park Eclipse Stakes R.A. *v.* Butterflies at Woolwich.	... ...
17	S	... ...	R.A. *v.* Butterflies at Woolwich.	... ...
18	**S**	... ...	... ...	... ...
19	M	... ...	... ...	... ...
20	T	... ...	... ...	... ...
21	W	... ...	... ...	... ...
22	Th	... ...	... ...	... ...
23	F	... ...	R.A. *v.* R.E. at Chatham.	... ...
24	S	5th Division (F.A. mixed) reaches Okehampton.	R.A. *v.* R.E. at Chatham.	... ...
25	**S**	... ...	.. ...	... ...
26	M	... ...	... ...	... ...
27	T	... ...	Goodwood begins.	... ...
28	W	... ...	... ...	... ...
29	Th	... ...	... ...	... ...
30	F	... ...	R.A. *v.* F.F. at Woolwich.	... ...
31	S	... ...	R.A. *v.* F.F. at Woolwich.	... ...

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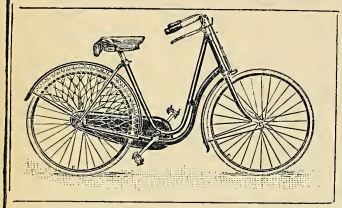

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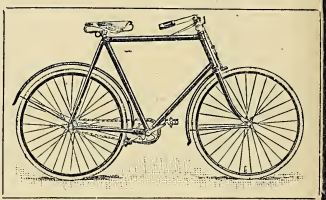

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NOTES

FROM

CORRESPONDING MEMBERS.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Notes of Lectures on Artillery in Coast Defence," by Major A. C. Hansard, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), and (*e*) set in the five examinations ending November 1895:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*e*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

Lithographic plates of Field Artillery Harness stripped and laid down for inspection, price for pair (lead and wheel), 1d.

The R.A. Institution have copies of the undermentioned works bound in cloth, which can be bought by members at the price of 1s. each :—

Colonel Walford's Translation of Prince Kraft's Letters on Cavalry.
,, ,, ,, ,, ,, ,, ,, ,, Infantry.

These are the copies as published in Translations with the "Proceedings" and should be useful to members who have joined since the date of their publication.

LIST OF ADDITIONS TO THE LIBRARY DURING THE MONTH OF MARCH, 1897.

PRESENTED.	BY WHOM.
Netherlands Artillery Atlas. Plates 129 to 134	Netherlands Government.
Annual Report of the School of Gunnery, 1896. Parts I. and II.	Secretary of State.
Approved arrangements for Siege Practice at Lydd	
Relation du Siege de Grave et de celui de Mayence	
Regulations for the equipment of the Regular Army. Part II., Sec. XI. Horse Artillery [Details.	
Part II., Sec. XIA. Field ,,	
Regulations for the Militia 1897	
Sketches of campaigning life	Lt.-Col. H. W. L. Hime, *late* R.A.
Annual Report of the National Artillery Association, 1896 (6 copies)	The Secretary.
Kane's List, 1815 edition	Major-General Gosset, C.B.
Two photographs of Ordnance Hieroglyphics	G. R. Hunter, Esq.
Volume of plates on Artillery Fortification and Architecture	Lt.-Col. A. O. Molesworth, *late* R.A.

PURCHASED.

Biologia Centrali-Americana—Archæology. Part VIII.
,, ,, Zoology. Part CXXXIII.
Die Feld Artillerie im Zukunftskampf. Von Lieut. Lagriz.
Uniformenkunde Lose Blätter zur Geschichte der Entwicklung der Militärischen Tracht. Vol. VII.
Memoirs of Monsieur Goulon.
Murray's Hand-book for Egypt.
The Seven Weeks' War. By H. M. Hozier, F.C.S., F.G.S.
L'Armée Belge. Parts IX. and X.
L'Armée Francaise 1897.
Figaro Illustré. No. 84. March 1897.
The Army of Northern Virginia in 1862. By William Allan, A.M., LL.D.

With a Show through Southern Africa. By Charles Du Val.
With the Boers in the Transvaal. By C. L. Norris-Newman.
Annuaire de la Marine pour 1897.
Les Navires de Guerre. By R. Berard.
Instruction Pratique Provisoire du 24 Décembre 1896, sur le service de L'Artillerie en campagne.
" " " " La Cavalerie.
" " " " L'Infanterie.
Life of Lieut.-Admiral De Ruyter. By G. Grinnel-Milne.
Album Militaire. Part V. 2nd series.
Twenty-three photos of French battleships.
Souvenirs Militaires Du Bon De Bourgoing 1791–1815. Publiés par le Bon Pierre De Bourgoing.
Journal D'un Commandant de la Comète, Chine-Siam-Japon (1892–93). Par Le Commandant Louis Dartige Du Fournet.
Guerre et Marine. Anon. 1897.

DEPOSITED.

DESCRIPTION.	BY WHOM.
Geschichte der Königlich Preussischen Fahnen und Standarten. 3 Vols.	Poultney Bigelow, Esq.

"Duncan" Gold Medal Prize Essay, 1897.

The Secretary has received Essays bearing mottoes as under:—

"Unhasting yet unresting work."
"The simpler the better."
"Practice does not make Perfect."
"It is a pleasure to stand upon . . . the sea."
"Vis sapientia pollet."
"Practice with instruction is . . . . Perfection."
"Dum spiro spero."
"Turris fortis mihi Deus."
"Semper paratus."

The R.A. Institution have acquired from Mr. Murray the entire remain of Duncan's 'History of the Royal Artillery.' 3rd Edition, as published by him in two volumes in 1879. These are available for purchase by members at the small charge of eight shillings a copy, bound in blue cloth and, as the stock is not large, supply will be made in the order in which applications are received.

Four unbound copies of the Records of the Royal Military Academy, 1st Edition published by the R.A. Institution in 1851 have lately been found.

As individual plates of this edition are advertised by dealers for sale at large prices the Committee now offer these four at a charge of three guineas a copy, unbound, with all faults.

Major-General M. W. E. Gosset, C.B. has presented a very fine copy of Kane's list, 1815 Edition to the R.A. Institution. This was the property of his father, Major Arthur Gosset, No. 1682 in Kane's list and is particularly valuable as it was most carefully entered up by him in manuscript and contains his accounts of several distinguished Artillery officers not recorded in either our later editions of the list or 'Proceedings'; many of these officers were friends of Major Gosset's and he writes as if he had personally received his information direct from those whose services are described. It is probable that from this book General Askwith will be able to make further additions to the notes he has so kindly placed at the disposal of the Committee and which will be incorporated in the new edition of Kane's list now under consideration.

Major J. H. Leslie, R.A. is publishing 'The History of Landguard Fort.' He is not aware of any previous history of the fort having been written and as both the fort and its neighbourhood have figured largely in every scheme of defence of the country from early in the XVI. century until the present date, he finds a great amount of interesting material on which to work.

Major Leslie has neglected no likely source of information and readers of thd book will find that, in addition to many most interesting items of ordnance any regimental history, the fort has been closely connected with the contemporare history of the country. The book is not quite ready for publication and further detailed notice will be given on this point.

Annual General Meetings.

The Annual General Meeting of the Royal Artillery Institution will be held at 3 p.m. on Friday 11th June, 1897 at the Lecture Theatre, Royal United Service Institution, Whitehall. It will be followed by the consideration of the Royal Artillery Charities and Games' Fund.

The Committee will be glad to receive suggestions of subjects for the 'Duncan' Gold Medal Prize Essay 1898; they should be connected with Field Artillery. A list of suggested subjects will be printed and sent to Messes a few days previous to the Annual General Meeting in order that members may come prepared to vote.

R.A. Drag Hunt.

A great number of officers will be sorry to hear that J. Babbage, Kennel Huntsman for nearly 14 years of the R.A. Drag, died at Woolwich on 20th February, 1897. He was a most excellent man for his place and through his thorough knowledge of hounds the R.A. Drag always had a pack fit to go. He was a great judge of hounds and often acted in that capacity at Shows. He is succeeded by Mills, who was formerly under him in the kennels.

R.A. Point-to-Point Races.

The Royal Artillery Point-to-Point Races 1897 were held on Saturday, 29th March at Hillmorton, by kind permission of Messrs. W. Rathbone, J. Parnell, G. Hawkes, J. Harris, J. Darby and Rev. R. S. Mitchison.

Stewards: Lieut.-Col. F. W. Eustace, R.H.A.; Major W. L. Paget, R.A.; Capts. F. D. Wing, R.H.A., J. L. Smith, R.A., J. Headlam, R.A., H. L. Powell, R.A., Lieut. J. C. Hankey, R.H.A., Capt. W. Faber, late R.A. Capt.

PRÉCIS
AND
TRANSLATION.

"MEMORIAL DE ARTILLERIA."

AN IMPROVED DRIVING-BAND FOR B.L. PROJECTILES.

TRANSLATED BY

MAJOR SAMUT, A.O.D.

The life of a gun, like that of man, is threatened by diseases which tend to bring it to an untimely end. Whilst medical science is daily bestowing its attention to arrive at and extirpate the source of disease in man, the problem of preserving guns from decay cannot but prove of vital interest to every gunner, knowing how much depends on a thorough good condition of our armaments and at what cost to the country they are produced and maintained. Erosion may be said to be to a gun what consumption is to the human body and any suggestion which may lead to minimize its deadly effects cannot but be hailed with satisfaction. We are therefore pleased to record the considerations of Captain Sarmiento of the Spanish artillery on the causes which produce erosion in guns and his ingenious method for ensuring a perfect obturation between the projectile and the bore of B.L. guns.

It frequently happens that guns which have only fired a small number of rounds are rendered unserviceable through deep erosion and cavities in that part of the bore comprised between the beginning of the rifling and the point in which the pressure reaches its maximum intensity.

The principal cause of this is, in our opinion, due to insufficient obturation afforded by the driving-bands now in use. It is true that their diameter is larger than that of the bore across the grooves, but this is not enough to stop the rush of gas, produced by the combustion of the charge, between the driving-band and the rifling.

It is, in fact, evident that, during the period in which the gas is acting on the base of the projectile, the former tends to make for the muzzle by endeavouring to escape between the sides of the bore and the driving-band on the projectile, and if the two latter be not perfectly concentric, it will doubtless attain its object producing along the unsealed grooves small furrows which will subsequently extend with amazing rapidity and end by rendering the gun unserviceable.

Another consideration of great importance and which demonstrates the insufficiency of obturation furnished by the present driving-band is:—That on being

discharged, the gun is expanded by the internal pressure and as the driving-band has become adapted to the shape and dimensions of the bore at the starting of the projectile, it follows that when the latter has travelled a certain distance or, in other words, when the dilatation of the gun becomes appreciable, the driving-band cannot keep up with the increased diameter of the bore and must, therefore, necessarily fail to fulfil one of the chief objects for which it is intended, allowing, as it does, the gas to rush past, causing the fatal erosions.

It may also happen that the diameter between two opposite grooves may present the maximum tolerated length in manufacture, whilst the driving-band might only be of the minimum tolerated gauge or, in other words, that the interior diameter between the grooves is unequal to the exterior diameter of the band. When this happens the escape of gas, on expansion of the bore, would attain a much higher degree.

We, therefore, see that in spite of the most scrupulous care in gun manufacture, gas escape may even happen during the first rounds fired from a new gun whilst guns which are worn by firing would, of course, be more liable to this result.

A careful inspection of bores in which erosion has been produced, demonstrates beyond dispute the truth of the foregoing remarks since it is noticed that although such erosion may commence at the beginning of the rifling, the cavities are shallower and less important at this point than a little further on towards the muzzle. This is explained by the fact that the first volume of gas, developed from the charge, overcomes the inertia of the projectile and starts it off with a weak pressure whereby the velocity of the escaping gas is only slight during the first moment and the effects produced are proportionately limited. As the pressure increases and reaches its maximum limit, which happens when the projectile has travelled a certain distance in the bore, the gas escapes with the maximum velocity producing the greatest amount of damage. Likewise, as the maximum pressure becomes exhausted, the energy of the gas gradually falls and the erosion is reduced and totally disappears close to the muzzle.

It is also noticed that erosion is more generally to be found in the grooves than along the lands and the reason of this is obvious: for the lands of the rifling, becoming imbedded in the driving-band, not only hermetically seal the passage of the gas, but are also further protected by the tongue of metal which each land displaces in the band.

The shape presented by erosion cavities is that which would be offered by an impression of a series of drops of water linked to one another or grease flakes hanging from a candle and their disposition in the grooves is such, that their widest extremity is next to the breech. This shape might be due to the irregular action of the gas which, having penetrated between the projectile and the bore, fails to find an outlet for its entire volume and is therefore repulsed and forced to spread and expand between the cannelures of the driving-band and the grooves of the rifling, thus forming strong currents in the already initiated erosion. Whatever may be the cause establishing their shape, it is a certain fact that, whether isolated or in groups, these cavities are united by a continuous channel of irregular dimensions whence it may be assumed that their formation must chiefly be attributable to gas escape between the driving-band and the sides of the bore, since, were they due to other causes, such as high temperature or chemical affinity between the products of combustion and the metal of the gun, they would undoubtedly be of the same size along the whole portion of the bore which is subjected to the same temperature and pressure, which, as has been stated, is not the case.

Doubtless even these last mentioned causes have a direct influence in the promotion of erosion and help to augment it, but the principal cause lies in the

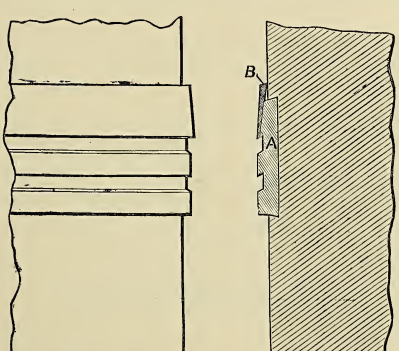
mechanical action of the gas and there is but little doubt that, could the latter's escape be prevented, the result of the other evils would be of little or no importance for the utmost that high temperature and chemical action could do would be to render the smooth and shiny surface of the bore rough and dull.

This mechanical action of the gas accounts for the rapidity of the deterioration of vents in guns with which friction copper tubes are used, whilst in those fired by vent-sealing tubes, the vents are preserved in good condition for an indefinite time.

In fact, although platinum is proof against the products of the combustion of gunpowder and unalterable under the high temperature developed in guns, the old platinum vents became unserviceable with the same facility as those made of other metals. In such cases the action of the gas on the metal may be compared to that of the emery wheel which, revolving at a high speed, detaches the molecules of the hardest substances brought in contact with it. Now that all nations are adopting smokeless charges, a perfect obturation between projectile and bore is of the utmost importance since the extreme fluidity of the gas developed by the new explosives facilitates its escape and leads to more rapid erosion than has hitherto been caused by the combustion of gunpowder.

Having thus shown that want of hermetic obturation, due to the faulty construction of the driving-bands now in use, is the main cause of the formation of erosion, we shall now pass to consider a new method by which this difficulty may be overcome.

The obturating crown, which we here propose, consists of two parts, viz.: a band rigidly attached to the body of the projectile and a detachable, movable ring.



The fixed band *A* is of the same shape as that of the ordinary driving-band now in use except that its anterior cone is serrated in a direction analogous to the twist of the rifling.

The shape of the movable ring *B*, which may be of gun-metal, brass or other convenient metal, is as shown in the cut, and works on the tapered cone *A* of the driving-band.

The contact surfaces of the two parts are conical, having, approximately, the same inclination.

The ring *B* is free to slide towards the base of the projectile in the direction of

the latter's axis; such motion being, however, limited by the annular shoulder formed on the anterior extremity of the ring.

When the projectile is rammed home, the outer surface of the ring *B* is forced against the cone of the rifling at the point in which the grooves originate and is compelled to slide on the conical and serrated surface of the driving-band *A*. This movement expands the diameter of the ring *B* which is jammed against the sides of the bore and invariably remains attached to the driving-band. The ring is prevented from sliding further backwards by its shoulder and cannot revolve on account of the serrations on the driving-band. In addition to the obtained increased diameter of the ring *B*, this sliding motion has also the effect of projecting the rear part of the ring over the first cannelure of the driving-band *A* thus forming a cup, the rim of which is forced forwards on discharge and prevents the gas from escaping.

The advantages claimed for this new system are:—

1.—Guaranteed obturation leading to greater shooting accuracy and uniformity of results.

2.—Its action is automatic and independent of the correct centering of the projectile in the chamber.

3.—Simplicity and economy of construction as the ring *B* can be punched out.

4.—No further precautions for transport are necessary than those at present used.

5.—Preservation from erosion and hence prolongation of the gun's life.

NOTES

FROM

CORRESPONDING MEMBERS.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below :—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Notes of Lectures on Artillery in Coast Defence," by Major A. C. Hansard, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), and (*e*) set in the five examinations ending November 1895 :—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

Lithographic plates of Field Artillery Harness stripped and laid down for inspection, price for pair (lead and wheel), 1d.

THE R.A. Institution have copies of the undermentioned works bound in cloth which can be bought by members at the price of 1s. each :—

Colonel Walford's Translation of Prince Kraft's Letters on Cavalry.
,, ,, ,, ,, ,, ,, ,, ,, Infantry.

These are the copies as published in Translations with the "Proceedings" and should be useful to members who have joined since the date of their publication.

List of additions to the Library during the month of April 1897.

PRESENTED.	BY WHOM.
Military History—Memoirs of Prince Eugene of Savoy and John, Duke of Marlborough	The family of the late Inspector-General of Hospitals, Bengal—E. Hare, C.S.I.
Contributo alla soluzione razionale del Problema Balistico. 3 Parts...	Captain di C. G. Ronca.
Seven pamphlets (German) on artillery organization	Lieut.-Colonel H. W. L. Hime (*late* R.A.).
Minutes of Proceedings of the Institution of Civil Engineers. Vol. CXXVII. ...	The Council.
Annual Report of the Board of Regents of the Smithsonian Institution for 1894	Smithsonian Institution.
The India List and India Office List... ...	Secretary of State for India.
Sketch map of the Turco-Greek Frontier and adjoining districts. I.D.W.O., No. 774, March 1897	Director of Military Intelligence.
Map of the Island of Crete, shewing the positions of troops 10th April, 1897. I.D.W.O., No. 1228, February 1897 ...	
Three small colored Lithographs, R.C.D. Plate 243, Sheets 1 and 2 and Plate 244	Secretary of State.
The Army (Annual) Act, 1897	
Instructions for practice—Horse, Field and Mountain Artillery..	
Examination papers Royal Military Academy, Woolwich, December 1896	The Governor.
The Rifle Brigade Chronicle, 1896	Lieut.-Colonel Willoughby Verner.
Military organization	Fd.-Marshal Sir Lintorn Simmons, G.C.B., G.C.M.G.
Report of the tests of metals and other materials for industrial purposes, 1893 and 1895...	Secretary of War, U.S.A.

PURCHASED.

The Navy and the Nation. By Lt.-Col. Sir George S. Clarke, K.C.M.G., F.R.S., and James R. Thursfield, M.A.
Soldiering and surveying in British East Africa. By Major J. R. Macdonald.
Naval and Military Trophies. Parts V., VI., VII. and VIII.
Album Militaire. Part VI. 2nd series.
The Sikhs and the Sikhs wars. By Sir C. Gough, V.C., and Arthur D. Innes, M.A.
Dictionary of National Biography, Vol. L.
Biologia Centrali-Americana—Zoology. Part CXXXIV.
Kriegsgeschichtliche Einzelschriften. Part XIX.
L'Armée Belge. Part II.
Annuaire de L'Armée Francaise pour, 1897.
Brave Deeds. Collected and illustrated by Lt.-Colonel G. Marsham.

"Duncan" Gold Medal Prize Essay, 1897.

The Secretary has received Essays bearing mottoes as under:—

"They also serve who only stand and wait."
"Pro rege et lege."
"Nec temere nec timide."
"Tempora mutantur et . . . . in illis."
"Thousands at his bidding . . . . . wait."
"Esse quam videri."
"Unita fortior."
"Quod non opus est, asse carum est."
"All things are ready, if our minds be so."
"Si vis pacem, para bellum."
"Defender."
"Practice makes perfect."
"En avant.
"Vis sapientia pollet."
"Yet sit and see . . . . . mockeries be."

The R.A. Institution have acquired from Mr. Murray the entire remain of Duncan's 'History of the Royal Artillery.' 3rd Edition, as published by him in two volumes in 1879. These are available for purchase by members at the small charge of eight shillings a copy, bound in blue cloth and, as the stock is not large, supply will be made in the order in which applications are received.

Four unbound copies of the Records of the Royal Military Academy, 1st Edition published by the R.A. Institution in 1851 have lately been found.

As individual plates of this edition are advertised by dealers for sale at large prices the Committee now offer these four at a charge of three guineas a copy unbound, with all fault.

Royal Artillery Institution Annual General Meeting, 1897.

The Annual General Meeting of the Royal Artillery Institution will be held at 3 p.m. on Friday 11th June, 1897 at the Lecture Theatre, Royal United Service Institution, Whitehall. It will be followed by the consideration of the Royal Artillery Charities and Games' Fund.

ADDITION TO RULES OF R.A. INSTITUTION.

The Committee intend to ask the Meeting to approve of the following addition to Rule XIX, page. 6 *viz.*—

Under the heading 'Language or Science' of the tabular form to add the word 'Travel' in the next line to the words 'Photography, Mechanism and Steam.'

And under the heading 'Proportion' of the same tabular form to insert opposite the word 'Travel' the words 'half tuition fees charged by the Royal Geographical Society,' provided the recipient satisfy the Council of the Royal Geographical Society as set forth in their letter dated 22nd March, 1897.

R.A. Games' Fund.

The Annual consideration of the R.A. Games' Fund will be taken after those of the R.A. Institution and Charities at the Royal United Service Institution on Friday, 11th June, 1897. The hour will be about 4 p.m. The Committee of the Games' Fund intend to ask the Meeting to allow them to give each year that they think fit a grant to the Regimental Point-to-Point Races' Committee for the provision of a small prize to the winner of each regimental race at that meeting.

The Games' Fund Committee hope there will be a good attendance of subscribers interested in the Point-to-Point Races and think that in extending the benefits of the Fund as they ask they are doing their best to encourage cross country riding in the Regiment.

ALDERSHOT.

ROYAL ARTILLERY STEEPLE-CHASES.

Saturday, 24th April, 1897.

These Races were again held at Aldershot and were attended by the greatest number of officers and their guests ever known. The weather, though fine, might have been more genial as the N.E. wind made both the road and the enclosure hill uncomfortable. Every race brought out a large field and, except that Major Goulburn broke his collar bone in the Race for the Gold Cup, the meeting was a great success.

Results:—

THE ROYAL ARTILLERY LIGHT-WEIGHT STEEPLE-CHASE of 50 sovs., with 10 to the second and 5 to the third. Two miles and five furlongs.

Mr. W. Elwes's No Name, 6 yrs., 11 st. 7 lb. Mr. E. J. R. Peel 1
Captain H. M. Ferrar's Rockfield, 5 yrs., 11 st. 7 lb.....Owner 2
Captain W. F. Wing's Seaforth II., 6 yrs., 11 st. 7 lb... Owner 3
Mr. J. F. Lamont's High House, 5 yrs., 11 st. 7 lb..... Owner 4
Mr. J. A. Hobson's Nimrod, aged, 11 st. 7 lb..... .....Owner 5
Mr. H. Phillips's Starlight, 6 yrs., 11 st. 7 lb. . .....Owner 0
Capt. A. C. Connal's The Cratur, 5 yrs., 11 st. 7 lb. Capt. Bidgood 0
Mr. R. F. Courage's Dungarvan, aged, 11 st. 7 lb. (car. 11 st. 7 lb.)..... .....Owner 0

Betting: 5 to 2 each agst. No Name and The Cratur, and 5 to 1 each agst. Rockfield, Nimrod, or any other.

The Cratur led from No Name and Nimrod, with Starlight next, for a mile and a half, when No Name drew to the front and won by thirty lengths; a bad third.

THE ROYAL ARTILLERY WELTER STEEPLE-CHASE of 50 sovs. to the winner, 10 to the second, and 5 to the third. Two miles and five furlongs.

Capt. H. L. Powell's The Priest, aged, 13 st. 7 lb. Capt. Wing 1
Mr. G. Stanley's The General, aged, 13 st. 7 lb.....Owner 2
Mr. H. Ramsden's Yorkey, aged, 13 st. 7 lb.....Mr. G. Gillson 3
Mr. H. T. Hildyard's Topsy, aged, 13 st. 7 lb.....Owner 4
Mr. J. C. A. Hankey's Jinny, aged, 13 st. 7 lb.....Owner 5
Mr. M. R. F. Courage's Ballyhooley, aged, 13 st. 7 lb....Owner 6
Capt. R. W. Breeks's Banshee, aged, 13 st. 7 lb.....Mr. Crockett 0
Mr. J. A. Hobson's Siddington II., aged, 13 st. 7 lb..... ...Owner 0

Betting: 2 to 1 agst. Yorkey, 3 to 1 agst. The Priest, 7 to 2 agst. The General, and 4 to 1 agst. Jinny.

Siddington II. cut out the work from The General and The Priest for nearly a mile, when the first named fell, leaving The General in front of The Priest. A mile from home the last two named closed, and The Priest won easily by four lengths; three lengths between second and third.

THE ROYAL ARTILLERY GOLD CUP of 100 sovs. with 50 sovs. to the winner, 20 to the second, and 10 to the third. Three miles.

Capt. H. M. Ferrar's PRINCESS CLARE, 6 yrs. 12 st.	OWNER	1
Capt. A. C. Connal's GREY BEARD, 6 yrs. 12st.	CAPT. BIDGOOD	2
Mr. Vanua Lava's RATEPAYER, aged, 13 st.	OWNER	3
Mr. W. Elwes's OAKDENE, 6 yrs. 12st.	MR. E. J. R. PEEL	4
Major H. A. Chapman's Roscommon, aged, 12 st. (car 12 st. 2 lb.	MR. G. GILLSON	0
Mr. E. C. Sandars's Favellan, 6 yrs. 12 st.	MR. J. F. LAMONT	0
Major C. E. Goulburn's Prince, aged, 12 st.	OWNER	0
Mr. A. G. Arbuthnot's Leila, aged, 12 st.	OWNER	0
Mr. M. R. F. Courage's Dungarvan, aged, 12 st.	MR. CROCKETT	0
Major W. H. Darby's Gossoon, aged, 12 st.	MR. H. M. DAVSON	0
Mr. P. W. Game's Derrylough, aged, 12 st.	OWNER	0
Capt. F. W. Wing's Rosa, aged, 12 st.	OWNER	0
Capt. Hanwell's Puff, aged, 12 st.	OWNER	0

Betting: 3 to 1 each agst. Puff and Oakdene, 5 to 1 agst. Favellan, 6 to 1 each agst. Roscommon, Leila, and Grey Beard, 8 to 1 agst. Princess Clare, and 10 to 1 agst. any other.

Grey Beard cut out the work from Princess Clare and Derrylough, with Oakdene next for two miles, when Derrylough fell. Half a mile from home Princess Clare assumed the lead and won by thirty lengths; ten lengths separated second and third. Oakdene was fourth.

A CONSOLATION STEEPLE-CHASE of 25 sovs. to the winner and 5 sovs. to the second. Two miles.

Major Darby's GOSSOON, aged, 12 st.	MR. DAVSON	1
Capt. Hanwell's PUFF, aged, 12 st.	Mr. E. J. R. PEEL,	2
Mr. Courage's BALLYHOOLEY, aged, 12 st.	OWNER	3
Mr. Phillips's Starlight, 6 yrs. 12 st.	OWNER	0
Capt. Breeks's Banshee, aged, 12 st.	MR. S. CROCKETT	0
Capt. Connal's Grey Beard, 6 yrs. 12 st.	CAPT. BIDGOOD	0

Betting: Evens on Puff, 6 to 4 agst. Grey Beard, 6 to 1 Gassoon or any other.

Puff held a slight lead of Gossoon until half a mile from home, when the latter closed, and won by six lengths; a bad third.

And two Military Races with fields of 7 and 5 runners.

UMBALLA.

SINCE the R.A.I. "Proceedings" heard last of us here the two batteries have undergone a few changes. During last hot weather Captain Watkins and Lieutenant Boulnois both had to leave on promotion. Their places have been taken by Captain S. D. Browne and Lieutenant Charlton. At the end of December Colonel Eden's five years of command were up and very much indeed he will be missed from amongst us. Lt.-Colonel Rich has just arrived from home to take up the command in his place.

Major Hawkins and Lieutenants Taylor and Sandys got home last year and found it just as enjoyable a spot as it was when they last left England.

During October and November, we had seven or eight very nice days snipe and duck shooting. The ground has to be reached from Umballa by train, but with a little trouble and keenness capital sport can be got.

During November, the Sirhind Polo Tournament was played for the second time, the previous year it had been won by the R.H.A. Subalterns from here. This year the "Chestnuts" had a troop team in (Captain Browne, Lieutenants Sandys, Baikie and Bright) and unfortunately in the first round drew against a strong station team, three of whom played for their respective cavalry regiments, so suffered an honourable defeat by five goals to four. This station team ultimately won the Tournament.

All December we were in practice camp five marches from here on the Sutlej canal. Here we were joined by 'B,' R.H.A. on their way from Rawal Pindi to Lucknow and also 50th F.B.R.A. from Jullundur and had a very good camp under Colonel Eden. On off days the duck and snipe got badly worried and we often brought in nice bags, between 800 and 900 head was bagged from leaving Umballa. The I.G. of Artillery and General Tyler both visited us in camp, the latter inspected here later in the cold weather.

The District Assault-at-Arms was held in January and the R.H.A. got a fair share of prizes.

Owing to the very dry year not much shooting has been done since returning from camp, but in February Lieutenants Sandys and Baikie were out near the Bikaneer Desert and brought back some nice heads of black buck and chinkara.

Our friends the mountain gunners from Jutogh have not been at Umballa this winter. They were in camp some 25 miles from here for practice and Lieutenants Bright and Greathed were there as range and recording officers.

At the late District Rifle Meeting the R.H.A. were not quite so successful as they were last year.

Field-days twice a week—as well as Cavalry and Horse Artillery days—have not allowed our horses or ourselves to get too big. Our latest work was a night march across country, a by no means easy job on a dark night.

Our latest dissipation was a Horse and Dog Show, when the R.H.A. carried off four firsts, four second and three third prizes. We are now thinking of the hot weather and what leave can be obtained; two or three are running home and a couple more are going to Kashmir shooting.

OBITUARY.

Major-General R. H. Crofton, who died at Powick on 23rd March, 1897, was first commissioned as 2nd Lieutenant, 5th May, 1837; became Lieutenant, 20th November, 1839; 2nd Captain, 9th November, 1846; Captain, 11th November, 1852; Lt.-Colonel, 26th May, 1858; Colonel, 26th May, 1863; and retired on full pay with the hon. rank of Major-General, 22nd August, 1868.

2nd Lieutenant J. E. C. Little, died at Shoeburyness on 8th April, 1897. He was only commissioned on 23rd March, 1897.

INTER-REGIMENTAL
RACKET AND BILLIARD MATCHES

R.A. *v.* R.E.

Played at Woolwich, April 2nd and 3rd, 1897.

BILLIARDS.

THIRD PAIR PLAYED AT 4.45 P.M., 2ND APRIL.

R.A.		R.E.
LIEUT. B. ATKINSON	beat	2ND LIEUT. NATION.
300 in 56 breaks.		200.
Best breaks 25, 21, 19, 18, 18, 14, 12, 12, 11, 10, 10.		Best breaks 16, 16, 12, 12, 10.

FIRST PAIR PLAYED AT 10 P.M., 2ND APRIL.

CAPTAIN J. A. TANCRED	beat	CAPTAIN G. F. NORTON.
300 in 57 breaks.		185.
Best breaks 34, 24, 18, 17, 16, 15, 15, 14, 12, 12, 11.		Best breaks 23, 13, 13, 13, 11, 11, 11.

SECOND PAIR PLAYED AT 11.30 P.M., 2ND APRIL.

MAJOR F. A. CURTEIS	beat	CAPTAIN W. C. HEDLEY.
300 in 47 breaks.		213.
Best breaks 48, 42, 26, 21, 19, 18, 16, 15, 11.		Best breaks 22, 21, 15, 14, 14, 14, 13.

The R.A. won all three events and take over the Cup for the coming year.

DOUBLE RACKETS.

FOUR-HANDED MATCH PLAYED AT 2.30 P.M., 2ND APRIL.

R.A.		R.E.
CAPTAIN A. M'N. COOPER-KEY. 2ND LIEUT. W. L. FOSTER.	beat	MAJOR L. B. FRIEND. CAPTAIN W. C. HEDLEY.

1st Game.	*2nd Game.*	*3rd Game.*	*4th Game.*
R.A. 15.	R.A. 15.	R.A. 15.	R.A. 15.
R.E. 9.	R.E. 4.	R.E. 8.	R.E. 10.

SINGLE RACKETS.

FIRST SINGLE MATCH PLAYED AT 11.15 A.M., 3RD APRIL.

R.A.		R.E.
2ND LIEUT. W. L. FOSTER	beat	CAPTAIN W. C. HEDLEY.

1st Game.	*2nd Game.*	*3rd Game.*	*4th Game.*
R.A. 18 (set 3).	R.A. 15.	R.A. 6.	R.A. 15.
R.E. 15.	R.E. 12.	R.E. 15.	R.E. 6.

SECOND SINGLE MATCH PLAYED AT 12.15 P.M., 3RD APRIL.

CAPTAIN A. M'N. COOPER-KEY	beat	MAJOR L. B. FRIEND.

1st Game.	*2nd Game.*	*3rd Game.*	*4th Game.*
R.A. 18 (set 3).	R.A. 12.	R.A. 15.	R.A. 15.
R.E. 17.	R.E. 15.	R.E. 9.	R.E. 5.

The R.A. won all three events and retain the Cup for the coming year.

R.A. & R.E. Annual Racket and Billiard Matches.

The results of the Racket and Billiard Matches up to and including the present year are shewn below :—

1873.

Rackets.		*Billiards.*	
Double. R.A. 1.	R.E. 4.	*Double.* R.A. 500.	R.E. 497.
Lieut. W. E. Denison.	Lieut. L. K. Scott.	Lieut.-Col. Drayson.	Capt. Scton.
" W. L. Davidson.	" S. M. Maycock.	Major Maitland.	" Mant.
Single. R.A. 2.	R.E. 3.	*Single.* R.A. 500.	R.E. 361.
eut. W. L. Davidson.	Lieut. S. M. Maycock.	Major Maitland.	Capt. Mant.

1874.

Rackets.		*Billiards.*	
Double. R.A. 4.	R.E. 1.	*Double.* R.A. 500.	R.E. 492.
Major Newman.	Lieut. L. K. Scott.	Major Maitland.	Capt. Warburton.
Lieut. Crookenden.	" Tower.	Lieut. Anstruther.	" Seton.
Single. R.A. 0.	R.E. 3.	*Single.* R.A. 370.	R.E. 500.
Lieut. Crookenden.	Lieut. Tower.	Major Maitland.	Capt. Warburton.

1875.

Rackets.		*Billiards.*	
Double. R.A. 0.	R.E. 4.	*Double.* R.A. 500.	R.E. 494.
Capt. Anderson.	Lieut. Tower.	Capt. Hazlerigg.	Major Warburton.
Lieut. Crookenden.	" *Hon.* M. G. Talbot.	Lieut. Anstruther.	Capt. Skinner.
Single. R.A. 0.	R.E. 3.	*Single.* R.A. 286.	R.E. 500.
Capt. Anderson.	Lieut. Tower.	Lieut. Anstruther.	Major Warburton.

1876.

Rackets.		*Billiards.*	
Double. R.A. 3.	R.E. 4.	*Double.* R.A. 500.	R.E. 451.
Major Murdoch.	Lieut. Penrose.	Capt. Hutchinson.	Major Warburton.
Lieut. Anstruther.	" Onslow.	Lieut. Anstruther.	Capt. Skinner.
Single. R.A. 1.	R.E. 3.	*Single.* R.A. 479.	R.E. 500.
Major Murdoch.	Lieut. Penrose.	Lieut. Anstruther.	Major Warburton.

1879.

Rackets.		*Billiards.*	
Double. R.A. 4.	R.E. 0.	*Double.* R.A. 500.	R.E. 430.
Capt. Griffiths.	Capt. L. K. Scott.	Major Hutchinson.	Major Seton.
Lieut. D. C. Carter.	Lieut. W. A. Cairnes.	Capt. Anstruther.	Capt. Glancy.
Single. R.A. 3.	R.E. 1.	*Single.* R.A. 500.	R.E. 421.
Lieut. D. C. Carter.	Lieut. W. A. Cairnes.	Capt. Anstruther.	Capt. Glancy.

1880.

Rackets.		*Billiards.*	
Double. R.A. 4.	R.E. 0.	*Double.* R.A. 500.	R.E. 430.
Lieut. King.	Lieut. R. S. Hedley.	Major Hutchinson.	Major Manderson.
" Cooper-Key.	" W. A. Cairnes.	Capt. Anstruther.	Capt. Glancy.
Single. R.A. 0.	R.E. 3.	*Single.* R.A. 458.	R.E. 500.
Lieut. D. C. Carter.	Lieut. W. A. Cairnes.	Capt. Anstruther.	Major Manderson.

1881.

Rackets.

Double.	R.A. 4.		R.E. 0.
Lieut. King.		Lieut. S. M. Maycock.	
" Cooper-Key.		" W. A. Cairnes.	
Single.	R.A. 3.		R.E. 1.
Lieut. Cooper-Key.		Lieut. W. A. Cairnes.	

Billiards.

Double.	R.A. 500.		R.E. 392.
Major Hutchinson.		Capt. Glancy.	
Capt. Anstruther.		" Broadfoot.	
Single.	R.A. 500.		R.E. 468.
Capt. Anstruther.		Major Mant.	

1882.

Rackets.

Double.	R.A. 4.		R.E. 2.
Lieut. C. D. King.		Lieut. Tower.	
" Cooper-Key.		" Friend.	
Single.	R.A. 3.		R.E. 1.
Lieut. Cooper-Key.		Lieut. Tower.	

Billiards.

Double.	R.A. 300.		R.E. 252.
Col. Maitland.		Major Seton.	
Lieut. Bruen.		Major Glancy.	
Single.	R.A. 500.		R.E. 437.
Col. Maitland.		Major Seton.	

1883.

Rackets.

Double.	R.A. 1.		R.E. 4.
Lieut. C. D. King.		Lieut. Tower.	
" Cooper-Key.		" Friend.	
Single.	R.A. 1.		R.E. 3.
Lieut. C. D. King.		Lieut. Tower.	

Billiards.

Double.	R.A. 267.		R.E. 300.
Col. Maitland.		Lieut. Bor.	
Capt. Anstruther.		Lieut. Dumbleton.	
Single.	R.A. 500.		R.E. 297.
Capt. Anstruther.		Lieut. Dumbleton.	

1884.

Rackets.

Double.	R.A. 3.		R.E. 4.
Lieut. Cooper-key.		Lieut. Tower.	
" C. D. King.		" Friend.	
Single.	R.A. 2.		R.E. 3.
Lieut. Cooper-Key.		Lieut. Tower.	

Billiards.

Double.	R.A. 277.		R.E. 300.
Lieut.-Col. Hazlerigg.		Lieut. Dumbleton.	
Capt. Anstruther.		Capt. Digby.	
Single.	R.A. 500.		R.E. 398.
Capt. Anstruther.		Lieut. Dumbleton.	

1885.

Rackets.

Double.	R.A. 4.		R.E. 2.
Lieut. Cooper-Key.		Capt. Friend.	
" C. D. King.		Lieut. Hamilton.	
Single.	R.A. 3.		R.E. 1.
Lieut. Cooper-Key.		Capt. Friend.	

Billiards.

Double.	R.A. 300.		R.E. 274.
Major Anstruther.		Capt. Digby.	
Capt. MacMahon.		" Baddeley.	
Single.	R.A. 500.		R.E. 248.
Major Anstruther.		Capt. Digby.	

1890.

Rackets.

Double.	R.A. 1.		R.E. 4.
Captain Cooper-Key.		Lieut. Hedley.	
Lieut. Simonds.		" Sheppard.	
Single.	R.A. 0.		R.E. 3.
Captain Cooper-Key.		Lieut. Hedley.	

Billiards.

Double.	R.A. 235.		R.E. 300.
Major Anstruther.		Captain Digby.	
Lieut. Lachlan.		" Dumbleton.	
Single.	R.A. 500.		R.E. 489.
Major Anstruther.		Captain Dumbleton.	

1891.

Rackets.

Double.	R.A. 2.		R.E. 4.
Captain Cooper-Key.		Captain Hedley.	
2nd Lieut. Galloway.		2nd Lieut. Sheppard.	
Single.	R.A. 3.		R.E. 2.
Captain Cooper-Key.		Captain Hedley.	

Billiards.

Double.	R.A. 300.		R.E. 250.
Major Anstruther.		Colonel Glancy.	
Lieut. Pollock.		Capt. Hedley.	
Single.	R.A. 414.		R.E. 500.
Major Anstruther.		Colonel Glancy.	

1892.

Rackets.

Double. R.A. 4. Captain Cooper-Key. Lieut. & Capt. Quinton.
R.E. 0. Captain Hamilton. Lieut. Blair.
Single. R.A. 3. Captain Cooper-Key.
R.E. 0. Captain Hamilton.

Billiards.

Double. R.A. 300. Captain Curteis. Captain Pollock.
R.E. 291. Colonel Glancy. Captain Roberts.
Single. R.A. 500. Captain Pollock.
R.E. 469. Colonel Glancy.

1893.

Rackets.

Double. R.A. 4. Captain Cooper-Key. Lieut. & Capt. Quinton.
R.E. 1. Captain Hamilton. Lieut. Blair.
Single. R.A. 2. Captain Cooper-Key.
R.E. 3. Captain Hamilton.

Billiards.

Double. R.A. 231. Major Curteis. Captain Pollock.
R.E. 300. Major Dorward, D.S.O. Lieut. Jones.
Single. R.A. 500. Major Curteis.
R.E. 303. Major Dorward, D.S.O.

1894.

Rackets.

Double. R.A. 1. Captain Cooper-Key. Captain C. D. King.
R.E. 4. Captain Hamilton. Lieut. Blair.
1 Single. R.A. 3. Captain Cooper-Key.
R.E. 1. Captain Hamilton.
2 Single. R.A. 0. Lieut. Quinton.
R.E. 3. Lieut. Blair.

Billiards.

1 Single. R.A. 255. Captain Vans-Agnew.
R.E. 300. Major Dorward, D.S.O.
2 Single. R.A. 285. Major Curteis.
R.E. 300. Lieut. Jones.
3 Single. R.A. 300. Captain Lachlan.
R.E. 134. Major Ruck.

1895.

Rackets.

Double. R.A. 3. Captain Cooper-Key. Lieut. Quinton.
R.E. 4. Captain Hamilton. Lieut. Blair.
1 Single. R.A. 3. Captain Cooper-Key.
R.E. 2. Captain Hamilton.
2 Single. R.A. 3. Lieut. Perkins.
R.E. 2. Lieut. Blair.

Billiards.

1 Single. R.A. 300. Captain Lachlan.
R.E. 210. Lieut.-Col. Dorward.
2 Single. R.A. 288. Lieut. Seligman.
R.E. 300. Captain Dumbleton.
3 Single. R.A. 300. Major Curteis.
R.E. 297. Lieut. Sladen.

1896.

Rackets.

Double. R.A. 4. Captain Cooper-Key. 2nd Lieut. Foster.
R.E. 1. Captain Hamilton. Captain Hedley.
1 Single. R.A. 3. Captain Cooper-Key.
R.E. 2. Captain Hamilton.
2 Single. R.A. 3. 2nd Lieut. Foster.
R.E. 1. Captain Hedley.

Billiards.

1 Single. R.A. 291. Major Curteis.
R.E. 300. Lieut. Sladen.
2 Single. R.A. 281. Lieut. Sykes, R.H.A.
R.E. 300. Lieut.-Col. Dorward.
3 Single. R.A. 300. Lieut.-Col. Davidson.
R.E. 276. Captain Roberts.

1897.

Rackets.

Double. R.A. 4. Captain Cooper-Key. 2nd Lieut. Foster.
R.E. 0. Major Friend. Captain Hedley.
1 Single. R.A. 3. 2nd Lieut. Foster.
R.E. 1. Captain Hedley.
2 Single. R.A. 3. Captain Cooper-Key.
R.E. 1. Major Friend.

Billiards.

1 Single. R.A. 300. Captain Tancred.
R.E. 185. Captain Norton.
2 Single. R.A. 300. Major Curteis.
R.E. 213. Captain Hedley.
3 Single. R.A. 300. Lieut. Atkinson.
R.E. 200. Lieut. Nation.

DIARY OF FIXTURES.

MAY.

Day of the Mth.	Wk.	Regimental.	Cricket, &c.	Private.
1	S	1st Division (F.A. Hilsea) reaches Okehampton. 1st Division (R.H.A. mixed) reaches Shoebury.	... ...	... ...
2	S	... ...	... ...	... ...
3	M	Position Finding Course begins.	... ...	... ...
4	T	... ...	Newmarket 1st Spring begins.	... ...
5	W	... ...	... ...	... ...
6	Th	... ...	... ...	... ...
7	F	... ...	... ...	... ...
8	S	2nd Division (F.A. Aldershot) reaches Shoebury. 1st Division Course at Golden Hill begins.	... ...	... ...
9	S	... ...	... ...	... ...
10	M	Woolwich week begins.	... ...	... ...
11	T	... ...	... ...	... ...
12	W	... ...	... ...	... ...
13	Th	... ...	... ...	... ...
14	F	Royal Artillery Ball at Woolwich.	... ...	... ...
15	S	2nd Division (R.H.A. Aldershot) reaches Okehampton. 3rd Division (F.A. Aldershot) reaches Shoebury.	Kempton Park Jubilee Stakes	... ...
16	S	... ...	... ...	... ...
17	M	... ...	... ...	... ...
18	T	... ...	Newmarket 2nd Spring begins.	... ...
19	W	... ...	... ...	... ...
20	Th	... ...	... ...	... ...
21	F	... ...	... ...	... ...
22	S	4th Division (R.H.A. Woolwich) reaches Shoebury.	... ...	... ...
23	S	... ...	... ...	... ...
24	M	... ...	... ...	... ...
25	T	... ...	... ...	... ...
26	W	... ...	R.A. *v.* Aldershot at Aldershot.	... ...
27	Th	... ...	R.A. *v.* Aldershot at Aldershot. Military Tournament begins.	... ...
28	F	... ...	... ...	... ...
29	S	5th Division (F.A. mixed) reaches Shoebury. 2nd Division Course at Golden Hill begins.	... ...	... ...
30	S	... ...	... ...	... ...
31	M	... ...	... ...	... ...

JUNE.

Day of the Mth.	Wk.	Regimental.	Cricket, &c.	Private.
1	T	... ...	Epsom Summer Meetinge begins.	... ...
2	W	... ...	Derby.	... ...
3	Th	... ...	... ...	... ...
4	F	... ...	Oaks.	Chestnut Troop Dinner.
5	S	6th Division (F.A. Weedon) reaches Shoebury.	... ...	... ...
6	S	Whit-Sunday.	... ...	... ...
7	M	Bank Holiday.	... ...	... ...
8	T	... ...	... ...	... ...
9	W	... ...	... ...	... ...
10	Th	... ...	... ...	... ...
11		Annual General Meeting of	REGIMENTAL DINNER.	
	F	R.A.I. at R.U.S.I at 3 p.m	R.A. *v.* Eton Ramblers at Woolwich.	... ...
12	S	7th Division (F.A., Woolwich) reaches Shoebury.	R.A. v. Eton Ramblers at Woolwich.	... ...
13	S	... ...	... ...	... ...
14	M	... ...	... ...	... ...
15	T	... ...	Ascot begins.	... ...
16	W	... ...	... ...	... ...
17	Th	... ...	... ...	... ...
18	F	... ...	R.A. v. R.E. at Woolwich.	... ...
19	S	3rd Division Course at Golden Hill begins.	R.A. v. R.E. at Woolwich.	... ...
20	S	... ...	... ...	... ...
21	M	... ...	... ...	... ...
22	T	JUBILEE CELEBRATION.		... ...
23	W	... ...	... ...	... ...
		... ...	... ...	... ...
24	Th	... ...	R.A. v. M.C.C. at Lord's.	... ...
25	F	... ...	R.A. v. M.C.C. at Lord's.	... ...
26	S	1st Division (F.A. Newcastle) reaches Church Stretton.	... ...	... ...
27	S	... ...	... ...	... ...
28	M	... ...	... ...	... ...
29	T	3rd Division (F.A. Woolwich) reaches Okehampton.	Newmarket 1st July begins.	... ...
30	W	... ...	R.A. v. Yorkshire Gentlemen at Woolwich.	... ...

PRÉCIS

AND

TRANSLATION.

ARCHIV FÜR DIE ARTILLERIE-UND INGENIEUR OFFIZIERE.

THE DEVELOPMENT OF THE AUSTRIAN MOUNTAIN ARTILLERY.

BY

2ND LIEUTENANT A. M. SETON, R.A.

No continental army, if we consider its necessities of imperial defence, is more dependent on the possession of a powerful mountain artillery than is that of Austria. France, Spain and Italy must, it is true, be prepared for operations in the Alps or in the Pyrenees, but in that case it would mostly be a matter of crossing those mountains and for this purpose a limited artillery force would suffice, since ordinary field artillery could operate in valleys and on table-lands. Germany would probably not require mountain artillery for any war that may be in store for her, although some really difficult defiles are to be found in the Vosges and on other parts of her frontiers. Russia originally formed her mountain artillery for service in the Caucasus and it is not difficult to see why she has maintained it, recently strengthened it and stationed a part of it near her western boundaries.

The case of Austria-Hungary is quite different. Many of her provinces belong essentially to Alpine regions; for example, the Tyrol, Carinthia, Carniola, Styria and Northern Austria; in the Carpathian system we have Transylvania and a part of Dalmatia. For the defence of her own territory proper Austria must be prepared for the possibility of mountain warfare. Even to the present day the hilly and wooded province of Bosnia and portions of Herzegovinia are very deficient in roads and other means of communication.

And yet only for the last thirty years has a real mountain artillery *service* existed in the Austrian army. Mountain *guns*, it is true, existed in the shape of one and three-pounders, which were superseded in 1843 by 12-pr. mountain howitzers. But those pieces were only to be found in depôts and arsenals and, although the Austrian gunner was formerly trained to work, and was drilled at, all other

natures of ordnance, his education in mountain artillery was extremely deficient; indeed, there were many old artillerymen who had never so much as seen a mountain gun. It thus came about that from 1838, (in which year considerable results were achieved by rocket batteries in the war with Montenegro and later against the Bosnian bandits), the rocket was for many years considered a thoroughly suitable weapon for all purposes of mountain warfare.

Not till 1848 was greater importance attached to the mountain artillery proper and a small proportion of mountain pieces attached to the rocket batteries. But this was only a temporary and more or less tentative measure, which was discontinued in 1859, and the further manufacture of mountain howitzers was suspended in the anticipation of the introduction of a more effective and longer ranging mountain gun. This appeared in the shape of the "Schiesswoll-Gebirgsgeschütz," which had very successfully passed its experimental trials.

But its career was short and in 1863 it was superseded by a three-pounder, which was quite as light and easy to work as its predecessor and possessed, in addition, a greater range. A still more important improvement was made in the establishment of a real mountain artillery *service—i.e.*, a *permanent* force of gunners trained *exclusively* for this branch of artillery work.

The rocket batteries survived only a year the introduction of their latest rivals. The batteries themselves were abolished and their *matériel* was distributed between the line regiments and the fortress magazines, while the mountain batteries (consisting now of four guns each) were provisionally attached to the field artillery. Two years later they were transferred to the garrison artillery and rendered good service in the 1869 rising in Croatia. The organisation of the mountain artillery remained, however, unchanged, although it shared with the field service the advantages of the introduction of breech-loading ordnance and the attending improvements of *matériel*. In addition, a few heavy mountain batteries of 7 and 9^{cm} guns were formed.

In 1878 and 1882 the mountain batteries again gave a good account of themselves in Bosnia and Herzegovinia, but the reorganisation and strengthening of the service was delayed until 1883—the year in which the 15th Army Corps was formed and the territorial system introduced.

The whole of the field artillery was then divided into regiments, each consisting of 14 brigades. To these regiments, as also to the garrison battalion in the Tyrol mountains, batteries were attached; in case of war the numbers of the batteries could be doubled, so that 120 mountain guns could be placed in the field, not including the 9^{cm} pieces above mentioned.

The extensive changes introduced in the Austrian artillery two-and-a-half years ago did not leave the mountain service untouched. One additional mountain battery was added to each regiment of artillery on its peace-footing and on its war-footing this number could be raised to two.

But it was soon recognised that many evils attached to this new organisation of the mountain artillery. It was found that if the mountain batteries remained with their respective regiments the commanding officers of the latter—already over-burdened with the duties and cares connected with the management of their own command—were unable to give the required attention to the welfare of the one mountain battery thereto attached. On the other hand, to detach the batteries—excepting for administrative and tactical purposes—from their regiments could hardly fail, in spite of the best intentions on the part of the commanding officers, to work unsatisfactorily. Again, in working in unison batteries quartered in different parts of the country, difficulties arose from the various languages or dialects spoken by the gunners of the different batteries.

These evils have to a great extent been removed by the creation of a new chief command, by the reorganisation of existing chief commands, by the permanent grouping and quartering of batteries and by the division of the mountain artillery into separate minor commands. It still remains to appoint an inspector-general for mountain artillery as was done six years ago for the garrison artillery.

The 1st command includes the mountain batteries of the 1st, 7th and 12th regiments (Hungary and Transylvania); the 2nd command those of the 2nd, 6th, 9th, 13th and 14th regiments (Northern Hungary and Southern Slavonia); the 3rd command those of the 8th, 10th and 11th regiments (Bohemia, Western and Eastern Galacia), the 4th command the artillery of Bosnia and Herzegovinia.

That the mountain batteries are for the purposes of administration still more or less connected to the field artillery regiments, from which they draw their supplies of men, is a matter of minor importance. The great point is that they are grouped in separate commands and, for tactical and general service purposes, are independent of the field artillery, and even the present improved arrangements we may regard as merely preparatory to that superior organisation which will, doubtless, soon replace them.

Mountain Artillery in Spain and Portugal.

In connection with the above it is interesting to note the present strengthening of the mountain artillery of both Spain and Portugal.

Spain possesses two regiments of mountain artillery, each of 4 batteries and each battery containing 6 guns. A battery consists of 4 officers, 101 men, 36 saddle-horses and 112 draught animals. The regiments are numbered 1 and 2 and are stationed at Barcelona and Vittoria.

It appears from a statement in the "*Revue du cercle militaire*" that the creation of another regiment of mountain artillery has been ordered by royal decree and that it is to be stationed in Cuba.

It will be composed of:—

1st, Three batteries, which will be attached for the present to the army now in the field;

2nd, Three more batteries, of which two will be formed from the 1st and one from the 2nd regiment.

The batteries now in Cuba are armed with 80^{mm} Plasencia guns, but the new batteries are to have the 80^{mm} Krupp guns. The difference will not be of importance, as the batteries act for the most part separately.

In Portugal the number of the mountain batteries was raised from two to four by a decree of September, 1895. These batteries form a brigade under the command of a major or lieutenant-colonel. In view of the mountainous character of Portugal itself and of the services that such artillery might well render in the Portuguese colonies, the necessity of having an efficient mountain artillery had long been felt by the military authorities.

NOTES

FROM

CORRESPONDING MEMBERS.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Notes of Lectures on Artillery in Coast Defence," by Major A. C. Hansard, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), and (*e*) set in the five examinations ending November 1895:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

Lithographic plates of Field Artillery Harness shaft draught stripped and laid down for inspection, price for pair (lead and wheel), 1d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

The R.A. Institution have copies of the undermentioned works bound in cloth which can be bought by members at the price of 1s. each :—

Colonel Walford's Translation of Prince Kraft's Letters on Cavalry.
" " " " " " " " Infantry.

These are the copies as published in Translations with the "Proceedings" and should be useful to members who have joined since the date of their publication.

List of additions to the Library and Museum during the month of May, 1897.

PRESENTED.	BY WHOM.
Ordnance instructions, rules, orders, and instructions for the future government of the office of the ordnance, dated 1683. *MS.*	Lt.-Genl. C. E. P. Gordon, C.B.
Accessions to the War Office catalogue of maps.	Dir. of Military Intelligence.
Examination papers, "A" to "M" officers of Volunteer Artillery, May, 1897. ...	D.-G. of Military Education.
AELIANI DE MILITARIBVS ordinibus instituendis more græcorum liber	a FRANCISCO ROBORTELLO. 1552.	Captain W. C. A. Nicholson, R.A.
Smithsonian Miscellaneous collections. Nos. 1034, 1035, 1038, 1039, 1071, 1072, 1073, 1075 and 1077.	Smithsonian Institution.

MUSEUM.

Shako plume and fittings complete, as worn by the cadets at the Royal Military College, Kingston, Canada.	Captain P. E. Gray, R.A.
Three coins and one token, dug up in the Barrack Field, Woolwich, in 1882-83. ...	Lt.-Col. J. W. T. Spencer, R.A.
Brass helmet worn by the artillery of the Ameer of Afghanistan. Kabul, 1880....	Maj.-Genl. H. C. Magenis, *late* R.A.
Russian rifle from the battle-field of Tchernaya, Crimea, 1855	
Jazail from Kyber Pass.	
Afreedy knife from Kyber Pass, 1878 ...	
Blunderbuss from Kabul, 1880.	
Shield picked up after the action at Charassia Afghanistan.	
Shield from the Zaimukt country, India. (Expedition under Sir C. Macgregor 1879.)	
Australian war club.	
Two New Zealand tomahawks.	
Wooden spear from New Zealand.... ...	
War canoe paddle from Fiji Islands. ...	

PURCHASED.

Kriegsgeschichtliche Beispiele aus dem Deutsch-Französischen Kriege, von 1870-71. Part III.
The Royal Navy. By William Laird Clowes & Co.
The life of Nelson. Vols. I. and II. By Captain A. T. Mahan, D.C.L., LL.D., U.S. Navy.
A narrative of the Boer war. By T. F. Carter.
Naval and Military Trophies. Part IX.
L'Armée Belge. Part XII.
Random shots from a rifleman. By Captain J. Kincaid.
The military opinions of General Sir. John Fox Burgoyne, Bart., G.C.B.; collected and edited by Captain The Hon. George Wrottesley, R.E.
Napoléon au Conseil D' Etat, par Emile Marco de Saint Hilaire. Parts I. and II.
Colored engraving. View of the Royal Military Academy, Woolwich. By Major Cockburn.
Colored engraving of Royal Artillery coatee, as worn in 1828 or 1829.
Colored engraving of British troops of the line about 1805.
The Naval Annual, 1897.
The Arabian horse, his country and people. By Major-General W. Tweedie, C.S.I.

The R.A. Institution have acquired from Mr. Murray the entire remain of Duncan's 'History of the Royal Artillery.' 3rd Edition, as published by him in two volumes in 1879. These are available for purchase by members at the small charge of eight shillings a copy, bound in blue cloth and, as the stock is not large, supply will be made in the order in which applications are received.

Four unbound copies of the Records of the Royal Military Academy, 1st Edition published by the R.A. Institution in 1851 have lately been found.

As individual plates of this edition are advertised by dealers for sale at large prices the Committee now offer these four at a charge of three guineas a copy unbound, with all fault.

Royal Artillery Institution Annual General Meeting, 1897.

The Annual General Meeting of the Royal Artillery Institution will be held at 3 p.m. on Friday 11th June, 1897 at the Lecture Theatre, Royal United Service Institution, Whitehall. It will be followed by the consideration of the Royal Artillery Charities and Games' Fund.

ADDITION TO RULES OF R.A. INSTITUTION.

The Committee intend to ask the Meeting to approve of the following addition to Rule XIX, page. 6 *viz.*—

Under the heading 'Language or Science' of the tabular form to add the word 'Travel' in the next line to the words 'Photography, Mechanism and Steam.'

And under the heading 'Proportion' of the same tabular form to insert opposite the word 'Travel' the words 'half tuition fees charged by the Royal Geographical Society,' provided the recipient satisfy the Council of the Royal Geographical Society as set forth in their letter dated 22nd March, 1897.

R.A. Games' Fund.

THE Annual consideration of the R.A. Games' Fund will be taken after those of the R.A. Institution and Charities at the Royal United Service Institution on Friday, 11th June, 1897. The hour will be about 4 p.m. The Committee of the Games' Fund intend to ask the Meeting to allow them to give each year that they think fit a grant to the Regimental Point-to-Point Races' Committee for the provision of a small prize to the winner of each regimental race at that meeting.

The Games' Fund Committee hope there will be a good attendance of subscribers interested in the Point-to-Point Races and think that in extending the benefits of the Fund as they ask they are doing their best to encourage cros country riding in the Regiment.

MALTA.

So many officers of the Regiment have put in some portion of their service at Malta that a few Regimental notes from there will probably be of interest.

Taking social matters first. The past winter season has been busier even than usual and all the hotels have been crammed throughout the winter.

The R.A. and R.E. Mess gave a really splendid ball on the 22nd February and advantage was taken of the wooden floor and the decorations to have a smaller dance on the following night, the hosts on this latter occasion comprising about twenty officers, both R.A. and R.E. A great feature of the decorations was the effective installation of the electric light, which displayed to the best advantage the noble proportions of the old Auberge.

The Mess has been very full all this year, the R.A. companies being much more up to strength than of old. Even Captains—a species of great rarity two or three years ago—have been encountered lately in strong coveys of ten or twelve. The large increase in the establishment of officers R.A. at Malta, contemplated in this year's Estimates, will render the present Mess accommodation quite inadequate and it seems probable (speaking without authority) that the out-messes at Tignè and Ricasoli will then be set on an independent footing or given some sort of official recognition.

The R.A. Stable Club now is very flourishing. The original founders will no doubt be glad to hear that of the £500 borrowed from Cox & Co. in 1888 only £180 still remains due, together with the £100 borrowed locally in 1892 for the extension of the stables. A most acceptable grant of £50 has been received from the R.A. Games' Fund, which it is proposed to expend in adding a much needed forage store.

A pony club has also just been started to assist the younger officers in defraying the initial expense of providing themselves with ponies. A respectable number of non-playing as well as well as of polo playing subscribers has been already secured and many of the last joined subalterns are now being entered to polo who otherwise would have been deterred by the £20 or so down which they would have had to find to start a pony. It is too soon yet to pronounce on the success of this new club, but with judicious buying on the part of the Committee it should prove of marked benefit to the Regiment here before next year's Polo Tournament comes round.

The polo team this year has suffered severely from the constant changes necessitated by the successive departures of Major Guise, 2nd Lieutenant Murch and, finally, Captain Williams-Wynn. The last-named, as captain and back of the

team, was especially hard to replace at the last moment. He did not leave till after the first round of the tournament in which we defeated the Royal Welsh Fusiliers. Captain Hickie, who had been playing No. 1 in the team till just before the tournament, unfortunately got ill and Lieutenant Robinson, who took over command of the team on Captain Williams-Wynn's departure, was at his wit's end whom to put in to make it up. Luckily the Mountain Battery for Crete arrived here the day before our team were to play their second round and Lieut. Freeland, who was well known on the Marsa some five years ago, very sportingly consented to play if he were mounted. He sailed away again with his battery the day after the match, so it was rather luck just catching him in the nick of time. The match was against the West Riding Regiment; our representatives played as follows :—

No. 1—Freeland
,, 2—H. Robinson
,, 3—Higgins
,, 4—D. E. Forman.

In the first two quarters the West Ridings had somewhat the best of it, but after that they began to tire, whilst our team played stronger than before, though No. 1 was rather done up, being out of condition. At the beginning of the fourth quarter the game stood at 2 all and it looked long odds on our winning, but then occurred a most unfortunate accident. The opposing team got away from a throw out and raced towards our goal; our No. 3 had nobody near him and was about 50 yards from his goal when the ball came up to him. Instead of hitting a back-hander, he tried to hit it hard across under his pony; it glanced off the pony's foot and went through our own goal! After that till the end of the match we simply penned the opposing team to their own goal line and should have scored a dozen subsidiaries if the Indian method of scoring were in force. However, the call of time found us still one goal to the bad and thus, to our great disappointment, we lost the match.

It is a singular and unfortunate coincidence that the captain of the team (Captain Milne) had to leave before the final of the tournament in 1896 also.

In rowing we have done well. The Governor's Cup for officers' six-oared boats was handsomely won by the R.A. this year, beating the Worcester Regiment, who won the trophy in 1896.

In golf the R.A. suffered through the illness of 2nd Lieutenant Calthrop, who helped to win us the Regimental Cup last year. This year our pair—Captain Hardy and 2nd Lieutenant Birch—succumbed to the Royal Navy.

The cricket outlook is still rather in the haze. We have recently lost Captain Adair, upon whom we were rather counting as a tower of strength.

We have no prominent racing owners at present. Lieutenant Hinton, who has recently left us, always had one or two useful ponies and won in his turn.

In the officers' tug-of-war at the Garrison Sports our team were pulled over by the Worcester Regiment, which musters some very burly men.

We have had a tremendous amount of work this year owing to the revision of the armament and I should be sorry to say how many tons of old ordnance we have returned to the Ordnance Department.

OBITUARY.

Lieutenant W. E. Bradish (retired) who died at Kimberley, S. Africa, on 6th April, 1897, was commissioned as Lieutenant, 1st August, 1883, and resigned 3rd July, 1886.

Captain A. M. C. Dale (retired) died at Ramsgate on 14th May, 1897. He was first commissioned as Lieutenant 18th February, 1880; became Captain, 13th June, 1888; was placed on temporary half-pay owing to ill health 20th November, 1895; and retired with a gratuity 14th April, 1897. Captain Dale served with the Kuram Valley Field Force during the Afghan War (medal), Burmese Expedition, 1886-7, (medal with clasp).

Colonel A. C. Davidson (retired) whose death occurred at West Stowell, Pewsey, on 18th May, 1897, joined the Madras Artillery as 2nd Lieutenant, 12th June, 1858; became 1st Lieutenant, 27th August, 1858; Captain, 9th June, 1868; Major, 21st September, 1875; and retired with the honorary rank of Colonel, 1st November, 1882.

Major-General R. G. H. Grant, (retired) whose death has been announced, was first commissioned as 2nd Lieutenant in the Madras Artillery, 11th June, 1840; became Lieutenant, 30th July, 1842; Captain, 11th June, 1855; Lt.-Colonel, 1st September, 1863; Colonel, 1st September, 1868; and retired as Major-General, 1st August, 1872; General Grant was employed on Field Service in Bundlecund, and in the Saugor and Nerbudda territories and was present at the capture of the hill fort of Keerapore, on 27th November, 1842.

Lieutenant L. L. Harper, who died at Zomba, British Central Africa, joined the Regiment as 2nd Lieutenant 17th February, 1888; and became Lieutenant, 17th February, 1891.

Lieutenant G. Plunkett (retired) died at Geddington, near Kettering, on 1st May, 1897. He was commissioned as Lieutenant, 15th December, 1863; and resigned 13th December, 1870.

DIARY OF FIXTURES.

JUNE.

Day of the Mth.	Wk.	Regimental.	Cricket, &c.	Private.
1	S	... ...	Epsom Summer Meeting begins.	... ...
2	W	... ...	Derby.	... ...
3	Th	... ...	... ...	... ...
4	F	... ...	Oaks.	Chestnut Troop Dinner.
5	S	6th Division (F.A. Weedon) reaches Shoebury.	... ...	... ...
6	S	Whit-Sunday.	... ...	... ...
7	M	Bank Holiday.	... ...	... ...
8	T	... ...	... ...	... ...
9	W	... ...	... ...	... ...
10	Th	... ...	... ...	... ...
11	F	Annual General Meeting of R.A.I. at R.U.S.I. at 3 p.m.	REGIMENTAL DINNER. R.A. *v.* Eton Ramblers at Woolwich.	... ...
12	S	7th Division (F.A., Woolwich) reaches Shoebury.	R.A. *v.* Eton Ramblers at Woolwich.	... ...
13	S	... ...	... ...	... ...
14	M	... ...	... ...	... ...
15	T	... ...	Ascot begins.	... ...
16	W	... ...	... ...	... ...
17	Th	... ...	... ...	... ...
18	F	... ...	R.A. *v.* R.E. at Woolwich.	... ...
19	S	... ...	R.A. *v.* R.E. at Woolwich.	E Troop (now D Battery) Annual Dinner—Naval and Military Club.
20	S	... ...	... ...	... ...
21	M	... ...	... ...	... ...
22	T	JUBILEE CELEBRATION.		... ...
23	W	... ...	... ...	... ...
24	Th	... ...	R.A. *v.* M.C.C. at Lord's.	... ...
25	F	... ...	R.A. *v.* M.C.C. at Lord's.	... ...
26	S	1st Division (F.A. Newcastle) reaches Church Stretton.	NAVAL REVIEW AT SPITHEAD.	
27	S	... ...	... ...	... ...
28	M	3rd Division Course at Golden Hill begins.	... ...	... ...
29	T	3rd Division (F.A. Woolwich) reaches Okehampton.	Newmarket 1st July begins.	... ...
30	W	... ...	R.A. *v.* Yorkshire Gentlemen at Woolwich.	... ...

JULY.

Day of the Mth.	Wk.	Regimental.	Cricket, &c.	Private.
1	Th	... ...	R.A. *v.* Yorkshire Gentlemen at Woolwich.	... ...
2	F	2nd Division (Siege) reaches Lydd.	R.A. *v.* Household Brigade at Chelsea.	... ...
3	S	... ...	R.A. *v.* Household Brigade at Chelsea.	... ...
4	S	... ...	... ...	... ...
5	M	... ...	... ...	... ...
6	T	... ...	... ...	... ...
7	W	4th Division (F.A. Exeter) reaches Okehampton.	Stockbridge Races begins.	... ...
8	Th	... ...	... ...	... ...
9	F	... ...	R.A. *v.* B.B. at Woolwich.	... ...
10	S	... ...	R.A. *v.* B.B. at Woolwich.	... ...
11	S	... ...	... ...	... ...
12	M	... ...	R.A. *v.* Harlequins at Woolwich.	... ...
13	T	... ...	R.A. *v.* Harlequins at Woolwich. Newmarket 2nd July begins.	... ...
14	W	... ...	... ...	... ...
15	Th	... ...	... ...	... ...
16	F	... ...	Sandown Park Eclipse Stakes	... ...
			R.A. *v.* Butterflies at Woolwich.	... ...
17	S	4th Division Course at Golden Hill begins.	R.A. *v.* Butterflies at Woolwich.	... ...
18	S	... ...	... ...	... ...
19	M	... ...	... ...	... ...
20	T	... ...	... ...	... ...
21	W	... ...	... ...	... ...
22	Th	... ...	... ...	... ...
23	F	... ...	R.A. *v.* R.E. at Chatham.	... ...
24	S	5th Division (F.A. mixed) reaches Okehampton.	R.A. *v.* R.E. at Chatham.	... ...
25	S	... ...	... ...	... ...
26	M	... ...	... ...	... ...
27	T	... ...	Goodwood begins.	... ...
28	W	... ...	... ...	... ...
29	Th	... ...	... ...	... ...
30	F	... ...	R.A. *v.* F.F. at Woolwich.	... ...
31	S	... ...	R.A. *v.* F.F. at Woolwich.	... ...

NOTES

FROM

CORRESPONDING MEMBERS.

List of additions to the Library and Museum during the month of June, 1897.

PRESENTED.	BY WHOM.
The Royal Warrant for 1897	Secretary of State.
Tables of small arms, machine guns, ammunition, &c., used in the British service, 1897	I.-G. of Ordnance.
Professional papers of the corps of Royal Engineers, Vol. XXII.	R.E. Institute.
Lectures on the training and *rôle* of "Position artillery and its duties on mobilisation," by Lt.-Col. A. J. Dunnage, R.A.; and on "Coast defence by garrison batteries of Volunteer Artillery," by Major R. M. B. F. Kelly, R.A. 12 copies	National Artillery Association.
Report of the Astronomer Royal for 1896...	Astronomer Royal.
Die Schlactplane, 1813–15	Poultney Bigelow, Esq.
Map. Schlacht bei Wartenburg den 3rd Oct., 1813	
Map. Situations Plan der Stadt Leipzig und Deren Umgebungen	
Four photographs of torpedo vessels—H.M.S. "Speedy," "Fame," "Boxer" and "No. 92"	Messrs. J. I. Thornycroft and Co.
Photograph of the "Thornycroft" water tube boilers	
Water colour sketch in gold frame, "Scene in the Blue Mountains, Jamaica" ...	Captain A. Capel-Cure, R.A.

PURCHASED.

Album Militaire. Part VII., 2nd series.
Etat Militaire du corps de l'artillerie, pour 1897.
Les Italiens en Afrique (1880-1896), par le Capitaine Pellenc.
Dictionnaire Militaire. Part IX.
Kriegsgeschichtliche Einzelschriften. Parts 20 and 21.
Schlachten Atlas. Part 53.
Biologia Centrali-Americana—Zoology. Part 135.
Notes on examination for rank of Lieut.-Colonel. By Captain E. L. Guilding.

THE Committee R.A.I. have agreed to undertake the organisation of parties of members of the Institution for the purpose of visiting battle-fields in Europe.

The idea is that a party of not less than five should have an itinerary worked out for them before leaving; one member of the party should be told off to study each a portion of the fields to be visited and on the day of the visit to his portion he should be prepared to act as guide so far as study of books and maps can qualify him.

If an officer with previous knowledge of the sites of battles is of the party he might either take entire charge or assist the individual exponents of each site as thought best.

At present the Committee think that a general use of bicycles by the party will greatly facilitate the visits.

The Committee will be glad to receive any hints or suggestions on the subject. The points they wish to emphasize are economy, both of time and money and strict attention to the study of the battle-fields only as soon as these are reached.

The R.A. Institution will provide a small collection of books and maps for general use by the party.

In accordance with the above it is proposed to arrange a tour this year to visit the battle-fields of the Franco-German war from Weissenburg to Sedan; the time to be spent on the sites of battle would be about a fortnight, commencing on a day to be fixed in the third week in August. Any member of the Institution wishing to join this tour is requested to communicate as soon as possible with the Secretary R.A. Institution, Woolwich.

R.A. Charities.

The Hon. Secretary R.A. Charities wishes to inform subscribers that by mistake only 1000 instead of 2000 copies of the Annual Report for 1896 were printed; he will be much obliged if any officer possessing a copy of the 1896 which he does not require will kindly forward it to the Hon. Secretary R.A. Charities, Woolwich.

R.A. Games' Fund.

THESE were considered after the General Meeting R.A.I. on 11th June, 1897.

The accounts presented are those to 31st May, 1897 and are practically for one complete year, as the last presented were made up to 3rd June, 1896.

Compared with those of last year they show a nearly identical expenditure on grants, the usual biennial increased expenditure on the racket and billiard matches and an increase of £10 in golf expenses.

The number of subscribers to the Fund, June 1896= 922.
" " " May 1897=1054.

The income increases steadily and, as the knowledge of the fund's work becomes better known throughout the Regiment, demands on it increase.

This year the racket and billiard matches were played at Woolwich and resulted in the Regiment winning every match and so holding both cups.

The Royal Engineers have this year for the third time won the Inter-Regimental Golf matches; these were played, as before, over the Sandwich links through the kindness of the St. George's Golf Club. The most satisfactory point in con-

nection with the matches and trials is that several very promising young players have come forward.

In accordance with a hope expressed at the last Annual Meeting the Committee published and sent to every member of the R.A.I. a pamphlet account of the fund with lists of subscribers to and grants from it; several officers found on reading it that their subscriptions to the fund had ceased and the result has been another very satisfactory accession of subscribers.

The meeting agreed to allow the Games' Fund Committee to make an annual grant to the Regimental Point-to-Point Races of such a sum as will provide suitable prizes, one each for heavy and light-weight races; the Committee think it most desirable to encourage cross-country riding in the Regiment and know of no other way in which the fund can encourage the sport than by giving prizes for the Point-to-Point Races. As the rules of the fund stood they had no power to make such a grant.

EXPENDITURE.

	£ s. d.	£ s. d.
Grants—R.A. Gibraltar (Europa), Officers' Stables	25 0 0	
" R.A. Leith Fort, N.B., Sailing Boat	30 0 0	
" R.A. Bermuda, Golf Links ...	5 0 0	
" R.A. Athlone, Sailing Boat ...	15 0 0	
" R.A. Gt. Yarmouth, Lawn Tennis Court	10 0 0	
" R.A. Landguard Fort, Lawn Tennis Court	10 0 0	
" R.A. Malta, Officers' Stables ...	50 0 0	
" R.A. Aldershot S. Camp, Croquet and Tennis Lawns.	25 0 0	
" R.A. Ipswich, Railings, Tennis Courts	25 0 0	
" R.A. Christchurch, Lawn Mower	10 0 0	
" R.A. Limerick, Cricket Pitch and Nets	10 0 0	
		215 0 0
Expenses Racket and Billiard Matches. Officers.		
"	6 17 1	
"	4 2 6	
		10 19 7
Expenses Racket and Billiard Matches.		
" " "	8 10 0	
" " "	9 4 0	
" " "	11 11 5	
" " "	1 15 0	
		31 0 5
Expenses Golf Trials and Matches. Officers.		
"	5 0 0	
"	8 0 4	
"	4 10 0	
"	3 1 0	
"	2 0 0	
"	5 8 2	
"	1 10 0	
"	1 1 0	
"	4 16 6	
"	7 11 0	
"	3 0 0	
"	5 8 10	
"	3 10 0	
		54 16 10
Clerk making out Annual Lists ...	...	1 0 0
Cheque book	...	4 6
Subscriptions refunded	...	1 14 0
Postage	...	1 4 10½
Printing	...	10 5 0
Balance at Messrs. Cox & Co. ...	163 8 4	
Balance in hands of Hon. Sec. ...	2 12 1	
		166 0 5
Total		492 5 7½

RECEIPTS.

	£ s. d.	£ s. d.
Credit brought forward		187 18 3½
Cox & Co. credited by	12 15 0	
" "	17 0	
" "	1 16 0	
" "	3 3 0	
" "	1 6 0	
" "	9 18 0	
" "	256 0 0	
		285 0 0
Subscriptions recd. direct ...	1 14 0	
	2 10 0	
		4 4 0
Dividends, July	2 19 7	
" Oct.	2 19 7	
" Jan.	2 19 7	
" April	2 19 7	
		11 18 4
R.A. Bermuda refund half of grant		2 10 0

NOTE.—The fund possesses £283 16s. 3d. 2½% Consols, and £174 16s. 5d. 3% Local Loans Stock.

Total 492 5 7½

Woolwich,
31st May, 1897.

A. J. ABDY, Major,
Hon. Secretary, R.A. Games' Fund.

POLO.

The first match of the season was played at Charlton Park, on the 14th May, against Chiselhurst and resulted in a victory for the home team by 9 goals to 2. The combination of the Artillery was much better than that of their opponents and they appeared to have the advantage in ponies. For the visitors Mr. Nickalls and Captain Bruce did most of the work, the latter playing a very good game. The sides were as follows:—

Royal Artillery.	Chiselhurst.
1. Captain Schofield.	Mr. Beck.
2. ,, Ferrar.	,, Nickalls.
3. Mr. Aldridge.	Captain Herbert.
Back Captain Hanwell.	,, Bruce.

As the R.A. band was away the 3rd Dragoon Guards kindly lent their's on this occasion.

Woolwich Garrison *v.* Ranelagh.

This match was played, on the 28th May, at Charlton Park. The ground was in excellent condition, owing to being continually watered for two days and, in addition, helped by the showers we had that morning and the preceding day. The ball travelled fast throughout the game. Soon after the commencement a good back-hander by Hanwell brought the ball well up to their opponents' goal, where a point ought to have been scored. A good run by Hargreaves relieved the Ranelagh goal and a little later good play from Longfield scored a goal for Ranelagh. Captain Ferrar now made a good run, which should have resulted in a goal had he not broken his stick and failed to score. As soon, however, as the second ten minutes began Ferrar scored for Woolwich and the period ended one goal all. The ball at the commencement of the third ten minutes kept close to the Ranelagh goal line till Hargreaves again brought it down and scored the second goal for his side. After the hit out Captain Schofield got right away with the ball, but unfortunately hit wide. The second twenty ended—Ranelagh, 2 goals; Woolwich, 1. The fifth ten minutes opened with a good run from Ferrar, but Ravenscroft, on his Argentine pony, was not to be defeated. During the last ten minutes Ranelagh again scored and thus won by three goals to one. We missed Aldridge, who was away with his battery at Shoeburyness. Hanwell did all he could to save defeat, but he was continually pressed by Hargreaves and Balfour, both on very fast and handy ponies. The sides were:—

Woolwich.	Ranelagh.
1. Captain Schofield.	Mr. Hargreaves.
2. ,, Ferrar.	,, Balfour.
3. ,, Nolan, 3rd Dragoon Gds.	Captain Longfield.
Back ,, Hanwell.	Mr. Ravenscroft.

Royal Artillery *v.* Hurlingham.

This match took place on Saturday, the 22nd, at Hurlingham and the following report of it is extracted from "Land and Water."

Royal Artillery.	Hurlingham.
1. Mr. J. B. Aldridge.	Mr. H. Bentley.
2. Captain H. M. Ferrar.	Earl of Harrington.
3. ,, J. Hanwell.	Mr. Gerald Hardy.
Back ,, H. Schofield.	Captain Bulkeley-Johnson.

The visitors were well mounted, the ponies played being—Mr. J. B. Aldridge, a

chestnut mare, Grace and a smart dark grey with plenty of pace, Tommy; Captain H. M. Ferrar, a white-faced quick and active chestnut, named Toss Up, a chestnut mare, Nora and a serviceable bay, Spinster; Captain J. Hanwell, Faugh-a-bala and a useful Arab, Kismet; Captain H. Schofield, Naoman and Boadicea. The visitors throughout had the best of the play, but I hardly expected them to make such short work of the home team. Hurlingham lacked combination, while the visitors made this their strong point. Individually the home team played well, but on several occasions I noticed Nos. 1, 2 and 3 all trying to be on the ball at once. The colours worn by the competing sides were not sufficiently distinctive. The Royal Artillery had white with a narrow dark blue band passing over the right shoulder and Hurlingham donned light blue, or were supposed, according to the programme, to wear blue and white. In the strong light a very pale shade of blue, such as Lord Harrington and Mr. Bentley wore, becomes almost impossible to distinguish from white, especially when the players are at the far end of the ground with the black boarding of the pigeon shooting enclosure as a background. The play was, on the whole, fast.

In the first period neither side scored, though Captain Bulkeley-Johnson got away twice from in front of his goal.

In the second period the Royal Artillery fouled in front of the Hurlingham goal and had to retire and hit off from the centre of their own end, but this loss was speedily retrieved and the Hurlingham goal was twice threatened and the visitors marked their first point, the actual scorer being, I believe, Mr. Aldridge. When ends were changed the play for the most part favoured the visitors and Captain H. M. Ferrar scored.

Score—Royal Artillery, 2 goals; Hurlingham, nil.

In the third period neither scored, though at the commencement the visitors were considerably pressed by a scrimmage in front of their goal. Here Captain Hanwell and Captain Ferrar got a run, but were unsuccessful and the ball went over the boundary by the band stand. On its return to play the Royal Artillery fouled and had to pay the penalty by hitting off from their centre. From the hit off the visitors followed the far boundary, the ball going behind at the Hurlingham end. When play was resumed the ball went out by the coaches and, on its being returned, the home team only averted disaster by hitting over their own back line.

Score—Royal Artillery, 2 goals; Hurlingham, nil.

In the fourth period Hurlingham opened by hitting off from their centre and, Lord Harrington getting possession, he and Mr. G. Hardy came away and the former marked the first point to the credit of Hurlingham. On ends being changed the visitors led off and Captain Ferrar again scored. On change of goals the play favoured the centre for a short time, but the visitors were too strong and again Captain Ferrar gave employment to the scorer. The home team now defended the goal at the stables end of the ground and when play commenced the ball at once went over the boundary by the band stand. On its being thrown in, Lord Harrington and Mr. Gerald Hardy got possession and, backing each other up, the latter scored.

Score—Royal Artillery, 4 goals; Hurlingham, 2 goals.

In the fifth period the visitors marked two points, in spite of capital fast play by the home team.

Score—Royal Artillery, 6 goals; Hurlingham, 2 goals.

In the sixth period Hurlingham menaced the R.A. end, but Mr. Aldridge made a capital run from the front of his goal and, giving way to his No. 2, Captain Ferrar once more scored. On ends being changed the visitors forced the game in front of the Hurlingham goal where a scrimmage took place and Captain

Bulkeley-Johnson, getting an opening, set the pace and, playing brilliantly, scored for Hurlingham. The home team now defended the goal by the chestnuts. The play opened by a combined attack on the part of Mr. G. Hardy and Mr. Bentley, which proved unsuccessful and the bell rang with the ball behind the visitors' goal.

Score—Royal Artillery, 7 goals; Hurlingham 3 goals.

OBITUARY.

Captain J. F. Browne, who was killed in action on the frontier in the Tochi Valley, 10th June, 1897, was first commissioned as Lieutenant, 9th December, 1884; and became Captain, 1st April, 1894. Captain Browne served in the Hazara Expedition, 1888 (medal with clasp); the Zhob Valley Expedition, 1890; 1st Miranzai Expedition, 1891; and Isazai Expedition, 1892.

Lieutenant H. A. Cruickshank was killed in action on the frontier in the Tochi Valley, 10th June, 1897. He joined the Regiment as 2nd Lieutenant, 25th July, 1890; and became Lieutenant, 25th July, 1893.

Colonel A. E. Garnault (retired), whose death occurred at Torquay, 2nd June, 1897, joined the Bengal Artillery as 2nd Lieutenant, 12th June, 1858; became Lieutenant, 27th August, 1858; Captain 8th December, 1869; Major, 31st December, 1878; Lieut.-Colonel, 9th April, 1886; Colonel, 9th April, 1889; and retired, 8th October, 1892. Colonel Garnault served in the N.-W. Frontier Campaign, 1863 (medal with clasp); Hazara Campaign, 1868 (clasp).

Lieut-Colonel R. C. E. North died at Rangoon, 15th June, 1897. He was commissioned as Lieutenant, 15th July, 1868; became Captain, 27th August, 1879; Major, 13th March, 1885; and Lieut.-Colonel, 1st April, 1895.

2nd Lieutenant S. V. Schofield, who died at Srinagar, Kashmir, 11th June, 1897, was commissioned as 2nd Lieutenant, 14th July, 1894.

Major-General C. H. Smith, C.B. (retired), who died at Wendover, Bucks, 4th June, 1897, joined the Regiment as 2nd Lieutenant, 18th December, 1845; became Lieutenant, 13th April, 1846; 2nd Captain, 17th February, 1854; Captain, 24th January, 1857; Major, 6th June, 1856; Brevet Lieut.-Colonel, 26th April, 1859; Colonel, 26th April, 1867; and retired on full pay, with the hon. rank of Major-General, 18th April, 1877. Major-General Smith served during the Crimean Campaign, was present at the siege and fall of Sebastopol, and (as a volunteer attached to the Highland Division) in the trenches with the siege train at the bombardments of the 6th and 17th June, and was present at the battle of the Tchernaya (medal and clasp, brevet of Major and Turkish medal). Served in the Indian Mutiny, 1857-8, including the battle of Cawnpore, the affair of Kalee Nuddy and occupation of Futtehghur. Commanded the Artillery at the affair of Kankur; also the Artillery in Brigadier Hale's column in 1858-9, including operations before and taking of the fort of Sandee (twice mentioned in despatches, brevet of Lieut.-Colonel, medal and C.B.)

Captain H. J. H. Winwood, whose death occurred at Gibraltar, the result of an accident at polo, was first commissioned as Lieutenant, 16th September, 1885 and became Captain 1st November, 1895.

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

THE Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows:—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings;" other things being equal brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Notes of Lectures on Artillery in Coast Defence," by Major A. C. Hansard, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), and (*e*) set in the five examinations ending November 1895:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

Lithographic plates of Field Artillery Harness shaft draught stripped and laid down for inspection, price for pair (lead and wheel), 1d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

THE R.A. Institution have copies of the undermentioned works bound in cloth which can be bought by members at the price of 1s. each:—

Colonel Walford's Translation of Prince Kraft's Letters on Cavalry.
" " " " " " " " Infantry.

These are the copies as published in Translations with the "Proceedings" and should be uesful to members who have joined since the date of their publication.

THE R.A. Institution have acquired from Mr. Murray the entire remain of Duncan's 'History of the Royal Artillery.' 3rd Edition, as published by him in two volumes in 1879. These are available for purchase by members at the small charge of eight shillings a copy, bound in blue cloth and, as the stock is not large, supply will be made in the order in which applications are received.

FOUR unbound copies of the Records of the Royal Military Academy, 1st Edition published by the R.A. Institution in 1851 have lately been found.

As individual plates of this edition are advertised by dealers for sale at large prices the Committee now offer these four at a charge of three guineas a copy unbound, with all fault.

List of additions to the Library during the month of July, 1897.

PRESENTED.	BY WHOM.
Four small coloured lithographs, R.L. Plates 231A, 242, 243 and 244 ...	Secretary of State.
Report on the R.A. Practice Camps held in the Bombay Command, 1896–7 ...	Brigadier-General Royal Artillery Bombay Command.
Report of the Council of the Institution of Civil Engineers, 1896–7 ...	Institution of Civil Engineers.
Minutes of Proceedings of the Institution of Civil Engineers. Vol. CXXVIII ...	
Map of the Greco-Turkish Frontier, in case	Major A. C. Bailward, R.A.

PURCHASED.

Dictionary of National Biography. Vol. LI.
Album Militaire. Part VIII, 2nd series.
Campaign of the Indus. By A. H. Holdsworth.
Journal Illustré de la Campagne de Russie, 1812.
La Nouvelle Tactique Allemande d'après les dernieres grandes manœuvres, et une Critique Allemande des grandes manœuvres Francaises.
Voyages to Madagascar. By Capt. P. Oliver, *late* R.A.

ROYAL ARTILLERY REGIMENTAL DINNER, 1897.

The Regimental Dinner took place this year again at the Whitehall Rooms, Hôtel Métropole, and was attended by 167 officers of the Regiment, H.R.H. the Duke of Cambridge in the Chair.

The dinner was established in the year 1861; the following table will enable a comparison to be made between the attendance in that year and the last four years:—

Ranks.	1861	1894	1895	1896	1897
Field-Marshal	...	...	1	1	1
General Officers	13	48	35	45	34
Colonels	36	24	28	36	40
Surgeon-Colonel	...	...	...	...	1
Lieut.-Colonels	...	22	25	15	18
Majors	28	34	23	36	40
Captains	47	23	20	30	21
Surgeons	2	...	...	...	...
Subalterns	15	11	3	18	12
Total	141	162	135	181	167

Several General officers who usually attend the dinner were unavoidably absent, among them were General Sir Collingwood Dickson, V.C., G.C.B., and General W. H. Askwith, both of whom were prevented from attending by illness; the Duke of Cambridge, in proposing the health of "The Senior Officers of the Regiment," made a feeling allusion to their absence.

The Toast List was as follows :—

(1.) The Queen.

(2.) The Prince of Wales
and the rest of the Royal Family.

(3.) The Royal Artillery,
responded to by
Field-Marshal Lord Roberts, V.C., K.P., &c.

(4.) The Senior Officers of the Regiment,
responded to by
General Sir Lynedoch Gardiner, K.C.V.O., C.B.,

who said :—

" Your Royal Highness and brother officers, I feel it an honour to be called upon to respond for the Senior Officers who have been retired by age, but I fear I shall prove but an indifferent spokesman in succession to my father, who responded for the corps 36 years ago on the occasion of our first annual dinner in London, H.R.H. the Duke of Cambridge in the Chair.

Wonderful as the changes and discoveries have been since the Queen came to the throne and much as they have been discussed, there is one which closely concerns us and which I have not heard noticed, viz. : the improved position of the officers of the R.A. with regard to those of cavalry and infantry.

Owing to the office of Commander-in-Chief being totally distinct from that of Master-General of the Ordnance, a wall of separation had been built up for more than 100 years between the purchase and non-purchase branches of the service, *i.e.*, between the cavalry and infantry under command of the Commander-in-Chief and the R.A. and R.E. under command of the Master-General of the Army —forming a barrier between the two, of which, I am sure, the junior officers of the present day can have no idea.

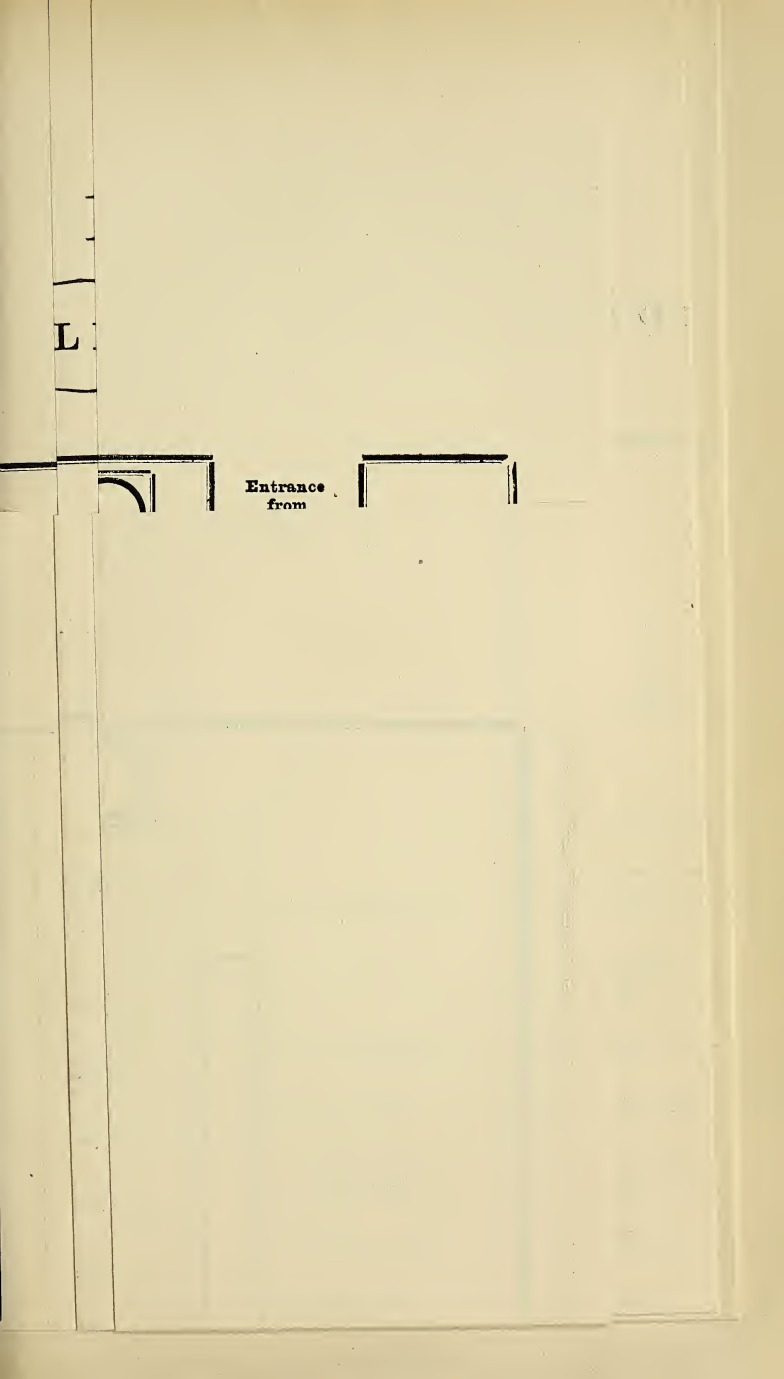
Up to 1848, when Sir Robert Gardiner was appointed Governor of Gibraltar, no artillery General had had a command except at Woolwich, the Head-Quarters of the Regiment, and this was natural enough for these appointments, being entirely in the gift of the Commander-in-Chief, were given solely to the officers under his command.

In every Continental army artillery Generals had had their full share of command. The Emperor Napoleon, the conqueror of Continental Europe (but not of Great Britain), began life as an officer of artillery and as such rose to command ; but it is not too much to say that if his rival and opponent and eventual conqueror, the great Duke of Wellington, had commenced his career in the artillery instead of the infantry, he would probably never have commanded an army in the field.

Many of my brother officers will remember that in the latter years of his life, my father printed and circulated to every member of both Houses of Parliament and others a series of pamphlets on the disabilities and requirements of the R.A.

One of these referred solely to the non-employment of our General officers.

This pamphlet happened to be read by the *late* Earl Grey, a statesman of very independent character, just at the time that the Government of Gibraltar fell vacant in 1848. It was customary for the Colonial Secretary, in any case where the Governor of a Colony held a military command, to refer the name of the selected Governor to the Horse Guards before submitting it for the Queen's approval ; and although the Duke of Wellington was the Commander-in-Chief, Lord Grey sent in my father's name for Her Majesty's confirmation without consulting either the Duke of Wellington or my father himself. He was at that time in frequent communication with the Queen and the Prince Consort, and the


L
Entrance
from

HÔTEL MÊTROPOLE.

BANQUETING HALL, WHITEHALL ROOMS.

Entrance from Reception Room.

Col. Slade, R. J. F.

Maj.-Gl. Finch, W. J.
Lt.-Col. Grubb, A.
Col. Trench, C.
,, Betty, J. F.
Maj.-Gl. Lowes, H. C.
,, Tweetie, M.
,, Clifford, M.
,, Geary, H. Le G.
Lt.-Gl. Brackenbury, Sir H.
,, Hills-Johnes, Sir J.
Genl. Le Cocq, H.
,, Smyth, Sir H. A.
Lt.-Gl. Radcliffe, R. P.
Fd.-Marshal Roberts, Lord
H.R.H.
Genl. Gardiner, Sir [Lynedoch
,, Arbuthnot, Sir C. G.
,, McMahon, C. J.
,, Chapman, E. F.
Maj.-Gl. Campbell, P. J.
,, Nicholson, S. J.
,, Maxwell, H. C.
,, Light, A.
Lt.-Gl. Bruce, H. Le G.
Maj.-Gl. Cor. C. V.
,, Woodcock, C. S.
,, Shebbeare, J. R.
,, Newall, D. J. F.

Col. Carey, W.

Lieut. Symon, W. C.
Lieut.-Col. Loraine, F. E. B.
Capt. Lloyd, M. B.
,, Strange, H. B.
Lieut. White, G. H. A.
,, M'Gildowny, W.
,, Ashmore, E. B.
Major Carter, A. H.

Col. Uppleby, J. G.
Major Benson, G. E.
Capt. Horne, H. S.
,, Wing, F. D. V.
Major Bell-Irving, A.
Lieut. Baillie, G.
,, Best, P. G.
Capt. Dawkins, J. W. G.
Col. Walford, N. L.
Major Blewitt, W. E.
,, Cowan, H. V.
Major Simpson, C. N.

Maj.-Gl. Edmeades, H.
Col. Gregory, W. V.
,, Thomson, C. W.
,, Browell, E. T.
,, Blaksley, E.
,, Watkin, H. S. S.
,, Barlow, W. B.
Lt.-Col. Walker, H. C. C.
Col. Torkington, H.
,, Clayton, E.
,, Bally, J. F.
,, Rainsford-Hannay, [R. W.

Major Dalrymple, F. D.
Lt.-Col. Spencer, J. W. T.
Col. Crookenden, H. H.
Lt.-Col. Empson, C. A.
Col. Josselyn, J. E.
Major Connolly, W. H.
,, Boileau, A. C. T.
Capt. Corbyn, H.
Col. Slade, F. G.
Lieut. Bamsay, Hon. C. M.
Col. Slade, J. R.
,, Tollner, B. L.
Col. Turner, A. E.

Maj.-Gl. Lloyd, F. T.
Col. Stewart, B. M'G.
Maj.-Gl. MacKenzie, R.
Col. Lockhart, R. D. E.
,, Holley, E. H.
,, O'Malley, G. H.
Lt.-Col. Davidson, W. L.
Major Bannatine-Allason, [R.
,, LLoyd, W. N.
,, Ricardo, H. G.
Lt.-Col. Eustace, F. J. W.
Major Balfour, W. E. L.

Lt.-Gl. Markham, Sir E.
Col. Calvert, A. M.
Lt.-Gl. Hay, Sir R. J.
Capt. Noble, Sir A.
Major Nicolls, E. G.
Capt. Stokes, A.
,, Elliot, W.
,, Anderson, J. D.
Lt.-Col. Coke, E. B.
Major Elmslie, F. B.
,, Hansard, A. C.
,, Darley, G. R.
Major Stone, F. G.

Maj.-Gl. Williams, A. H. W.
Col. Lennard, Sir J. F.
,, Henry, G. C.
Maj.-Gl. Dillon, Hon. R. V.
Lt.-Col. FitzRoy, E. A.
Col. Stratton, J. H.
Capt. Scott, W.
Col. O'Callaghan, D. D. T.
Maj. Flint, E. M.
Lt.-Col. Aylmer, F. A.

Maj.-Gl. Rideout, A. K.
,, Sandham, R.
Col. Ditmas, F. F.
Major Bowles, F. A.
,, Cleeve, W. F.
,, Purvis, A. B.
,, Blewitt, C. T.
Lieut. Sanders, E. C.
,, Simpson Baikie, H. [A. D.
Major Oakes, R.
,, Newton, J. W. M.
Lt.-Col. Newbigging, P.C.E.

Col. Prescott, A. S. K.
,, Thornhill, C.
Lt.-Col. Clarke, Sir M. J.
Major Craig, J. F.
Col. Congdon, J. J.
Capt. Jenkinson, H. L. A.
,, Askwith, H. F.
,, King, A. D'A.
Major Jeffreys, H. B.
,, Stirling, J. W.
,, Lindsay, W. F. L.
,, May, E. S.
Col. Montgomery, E. A.

Col. Pretyman, G. T.
,, Stirling, Sir W. G.
,, Elton, F. C.
Lt.-Col. Watson, S.
Capt. Churchill, A. B. N.
Major Cooper, F. E.
,, Bailward, A. C.
,, Findlay, N. D.
,, Darby, W. H.
Capt. Chambers, A.
Major Acton, T. H. E.
,, Leach, R. P.

Maj.-Genl. Cumberland, [W. B.
Col. Disney, T. R.
,, Corbett, E.
Lt.-Col. Downing, C. M.
,, Foote, F. O. B.
Major Sclater, H. C.

Maj.-Gl. Courtenay, H. B.
,, Trevor, F. C.
Capt. Worthington, J. Y.
Major Lecky, F. B.
,, Armitage, E. H.
,, Barlow, G. N. H.
Capt. Clark, C. W.
,, Tyler, A. M.

N.B.—A few names are unavoidably omitted.

PLAN OF TABLE.

Prince one day took him aside to congratulate him on being Governor of Gibraltar. The Queen had approved of his nomination and his name would appear in the next Gazette.

Next day my father, supposing the usual routine to have been followed, went up to Apsley House to thank the Duke for his share in the appointment and was much taken aback when the Duke replied: 'Well, Gardiner, I'm glad it is so; but it's the first I've heard of it.'

A few years later the office of Master-General of the Ordnance was abolished and the R.A. and R.E. were placed where they always ought to have been, under the Commander-in-Chief. The abolition of purchase also tended towards the present satisfactory arrangement, and I am glad of this opportunity of thanking H.R.H. for the loyal way in which, as Commander-in-Chief, he gave fair play to the new order of things.

I can quote no more striking illustration of this than the case of the distinguished Field-Marshal who has just responded so eloquently for the active list of the R.A. and whom we all regard with respect as a comrade who has brought much honour to the corps by his brilliant services in command in the field—I think some of us who have read his recent publication may be disposed to add—'and by his power as an author.'"

Sir Lynedoch concluded by proposing the toast of H.R.H. the Duke of Cambridge, Colonel-in-Chief of the R.A., who has presided over these annual dinners for 36 years.

The Band, after playing "The Roast Beef of Old England," withdrew until the toast of the Queen was given, when the National Anthem was played. Subsequently a full and brilliant selection of music was given.

The membership of the Dinner Club has again increased by the largest number of members who have joined in any one year, excepting 1896: this year the number joining was 18, which, after deducting deaths and withdrawals from other causes, brings up the total membership of the club to 303, as compared with 266 in 1895. The membership of the Club now stands as follows:—

Field-Marshals	1
General Officers	101
Colonels	56
Lieut.-Colonels	32
Majors	60
Captains	36
Subalterns	17
Total	303

RULES.

No suggestion has been received for any change in the Rules, which are as follows:—

(1.) All officers serving, or who have served, in the Royal Artillery are eligible to attend the annual general Regimental Dinner.

(2.) Officers actually serving, are eligible to become members of the Royal Artillery Dinner Club at an annual subscription of 5s., and an entrance fee of—

(*a*) For 2nd Lieutenants ... ... nil.
(*b*) ,, ,, 5s. for every year of service up to three years.
(*c*) ,, Captains ... ... £1 0s. 0d.
(*d*) ,, Majors ... ... £1 5s. 0d.
(*e*) ,, Lieut.-Colonels ... ... £1 10s. 0d.

The entrance fee and first annual subscription are payable on joining, and should accompany the notification to the hon. secretary that the officer wishes to become a member of the Dinner Club.

Subsequent annual subscriptions should be paid into Messrs. Cox & Co., Charing Cross, on the 1st of January, to the credit of the Royal Artillery Dinner Club.

(3.) Until further notice the price of the dinner will be :—

	£	s.	d.
For subscribers (members of Dinner Club)	0	13	0
„ non-subscribers	1	12	0

Payment for the dinner should be made to the hon. secretary at the time intention to dine is notified, or in any case not later than three days before the dinner. Officers who bank with Messrs. Cox & Co. are informed that the price of the dinner will be charged in their accounts.

(4.) Notification of intention to dine should be made to the hon. secretary as early in June as possible, if notification is not *received* two clear days before the date of the dinner an extra payment of 5s. will be required. Withdrawal of names of officers unavoidably prevented from dining should be effected two clear days before the date of the dinner, as after that time no money can be returned.

(5.) (*a*) It is particularly requested that officers will inform the hon. secretary as early as possible, if they wish seats reserved for themselves and their friends, and the position they would prefer. *It should be noted that the arrangement of seats beforehand is far the best plan, both in the interests of the officers dining, and of the secretary, as it enables the latter to meet the wishes of officers in a manner which would be impossible if the allotment of seats be left to haphazard arrangements at the last.*

(*b*) Generally speaking, applications for seats will be dealt with in the order in which they are received : all applications must be received two clear days before the dinner.

(*c*) When any number of officers wish to sit together, applications must be received from each member of the party ; otherwise confusion is apt to occur, owing to the same officer being possibly included in two parties without his knowing it.

(*d*) General officers and colonels-commandant will be placed in order of regimental seniority, alternately to the right and left of H.R.H. the Colonel of the Regiment, unless they arrange otherwise with the hon. secretary.

(*e*) A plan of the table can be seen at the War Office until two days before the dinner : the day immediately preceding the dinner will be occupied in filling in the names of officers opposite the seats allotted to them, an in preparing two copies of the plan so completed, one for the dining-room and one for the ante-room, to be placed in the Whitehall Rooms by 2 p.m. on the day of the dinner.

(*f*) Officers are particularly requested not to change their seats, after the official cards have been put in the allotted places at the table, without communicating personally with the hon. secretary or his clerk. Much difficulty has been caused by officers leaving the official cards in the allotted places and, at the same time putting their own visiting

cards in other places; the result being that it has appeared as if an insufficient number of seats were provided.

(*g*) Officers who have not previously arranged with the hon. secretary for seats, can secure any vacant seats by placing their visiting cards in the required places on the table after 3 p.m.; but it is essential that no cards be put upon the table, unless the officers whose names are on the cards, are certain to occupy the seats, otherwise the same difficulty will be experienced as explained in (*f*) above.

(6.) No dinner tickets are required, but it is particularly requested that every officer will give his visiting card to the clerk at the entrance to the Whitehall Rooms, in order that a correct tally of the officers who dine may be kept. The occasion to comply with this formality leads to a discrepancy between the numbers as counted at dinner by the hotel officials, and the numbers furnished by the hon. secretary to the management. Officers who enter from the hotel entrance in Northumberland Avenue, instead of by the Whitehall rooms, entrance in Whitehall Place are most liable to omit giving their cards or names at the door.

(7.) The band will not play during dinner, but will withwraw after playing "The Roast Beef of Old England," and come in again in time to play "God Save the Queen" after the first toast; selections will subsequently be performed between the toasts and speeches.

(8.) The accounts can be inspected at the War Office by any officer of the Regiment, and any suggestion which may be received in connection with the general management of the dinner and the dinner funds, will be brought forward by the hon. secretary for discussion at the annual meeting which is held at the Royal United Service Institution, at 3 p.m. on the day of the dinner.

War Office, Pall Mall,
18th June, 1897.

F. G. Stone, Major, R.A.,
Hon. Secretary R.A. Dinner Club.

Obituary.

Major-General G. J. Smart, died at Carno, N. Wales, 27th June, 1897. He was first commissioned as 2nd Lieutenant, 18th June, 1851; became 1st Lieutenant 12th July, 1853; 2nd Captain, 5th May, 1858; Captain, 5th April, 1866; Major, 5th July, 1872; Lt.-Colonel, 20th April, 1877; Brevet-Colonel, 1st July, 1881; Regtl. Colonel, 1st October, 1882; and Major-General, 1st November, 1890. General Smart served at Halifax, N.S., from 1st October, 1853, to 22nd May, 1857; in India from 11th October, 1857, to 10th September, 1858, and was present during the Mutiny at the actions of Chanda and Sultanpore, siege and capture of Lucknow, actions of Barree, Sirree and Nawabgunge. Despatches, *London Gazette*, 17th July and 17th September, 1858 (medal with clasp). Served in Ceylon, 10th September, 1858, to 1st March, 1861; Mauritius, 27th September, 1864, to 24th April, 1866; Barbados, 25th April, 1866, to 20th December, 1869; India, 31st December, 1870, to 13th October, 1876; Celyon, 14th April, 1880, to 14th November, 1882; India, 15th November, 1882, to 28th February, 1891. Was Brigadier-General Commanding Madras District, 24th December, 1887, to 27th February, 1891; Major-General on the Staff, C.R.A. Gibraltar, 19th May, 1892, to 3rd February, 1894; and Commanded the Woolwich District from 4th February, 1894, to the date of his retirement, 8th December, 1895.

Major-General D. G. Anderson (retired) died in London, 12th July, 1897. He was commissioned as 2nd Lieut. in the Bombay Artillery, 14th June, 1845; became Lieutenant, 31st March, 1849; Captain, 27th August, 1858; Lt.-Colonel, 16th March, 1866; Colonel, 14th September, 1870; and retired on full pay with the hon. rank of Major-General, 1st August, 1872. General Anderson served in the Punjab Campaign in 1849, including the siege and capture of the Fortress of Mooltan; battle of Goojerat; surrender of the Sikh Army at Rawal Pindi (medal with two clasps).

Major-General P. Bedingfeld (retired), who died at Windsor, 3rd July, 1897, was first commissioned as 2nd Lieutenant, 16th December, 1846; became 1st Lieutenant, 24th November, 1847; 2nd Captain, 20th June, 1854; Captain, 26th October, 1858; Brevet-Major, 15th February, 1861; Lt.-Colonel, 3rd September, 1870; Colonel, 3rd September, 1875; and retired on retired pay, with the hon. rank of Major-General, 20th April, 1886. General Bedingfeld served in the China War, 1860, and was present at the capture of the Taku Forts and surrender of Pekin (medal and two clasps, brevet of Major).

2nd Lieutenant A. F. M. Browne, whose death occurred at Kurrachee, on 6th July, 1897, was commissioned as 2nd Lieutenant, 21st March, 1896.

General Sir R. Cadell, K.C.B., died at Cockenzie House, Mid-Lothian, 30th June, 1897. He joined the Madras Artillery as 2nd Lieutenant, 11th June, 1842; became 1st Lieutenant, 13th July, 1845; Brevet-Captain, 11th June, 1857; Brevet-Major, 28th August, 1858; Brevet-Lt.-Colonel, 26th April, 1859; Brevet-Colonel, 11th February, 1867; Major-General, 31st December, 1878; Lieutenant-General, 27th February, 1882; General, 31st March, 1883; and Colonel-Commandant, 15th June, 1885. Sir Robert Cadell served during the Crimean Campaign, 1854, and was present at the defence of Eupatoria; siege and fall of Sebastopol; despatches, *London Gazette*, 30th November, 1855 (medal with clasp, Turkish medal, 4th class Medjidie, and brevet of Major). Indian Mutiny, 1857–60, actions of Doomooreagunge, Baunriah, and Toolseepore. Despatches, *London Gazette*, 24th March, 1859 (medal with clasp, brevet of Lt.-Colonel).

Major-General G. Maister (retired), who died at Leamington, 16th July, 1897, was first commissioned as 2nd Lieutenant in the Bengal Artillery, 11th June, 1842; became 1st Lieutenant, 3rd July, 1845; Brevet-Captain, 11th June, 1857; Brevet-Major, 23rd July, 1866; Lt.-Colonel, 26th February, 1867; Colonel, 26th February, 1872; and retired on full pay, with the hon. rank of Major-General, 1st August, 1872. General Maister served in the Gwalior Campaign, and was present at the battle of Maharajpore, on 29th December, 1843 (bronze star). Punjab Campaign, 1848–49, including the battles of Chillianwallah and Goojerat (medal with two clasps). Served with the force under Brigadier Bradshaw in the Peshawar Valley, 1849–50; forcing of the Kohat Pass, under Sir Charles Napier, 1850; affairs against the Momunds and Ootman Khails in the Eusofzaie country in 1852, under Sir Colin Campbell; Bozdar expedition in 1857, under Brigadier Chamberlain; expeditions under Brigadier Chamberlain against the Khabl Kheyl Wuzeerees and against the Mahsood Wuzeerees, including the night attack on the camp at Palozeau and forcing the Burrarah Pass (medal with clasp).

9

PRÉCIS

AND

TRANSLATION.

"RUSSIAN ARTILLERY JOURNAL."

CAVALRY AND THE ARTILLERY DUEL.

BY

MAJOR E. A. LAMBART, R.A.

A WRITER in the *Russian Artillery Journal*, in an article entitled "Artillery questions of the day," lays stress on the possible action of cavalry in the preliminary stages of the artillery duel in a general action. It does not appear from a study of the latest cavalry and artillery drill-books of our service that this has hitherto been much considered by either arms.

The following are extracts from the article referred to :—

"1.—The principle of modern tactics, that as large a force of artillery as possible should be employed at the commencement of a battle to prepare the way for the infantry, entails many difficulties on the former arm as regards the deployment of the long line of guns in the selected position and calls for carefully thought-out measures of protection for the artillery at this period of an action.

"2.—The preliminary stages of an action will necessarily be fought principally by artillery of long range and cavalry as the arm of rapid daring tactics.

"3.—It would be difficult to find better opportunities for bold action on the part of cavalry, even in small bodies, than the preparatory deployment of artillery masses and we must therefore expect at this period desperate attacks from that arm.

"4.—At the time of its deployment artillery is deprived of all independence of action and loses entirely its power of self-defence. Especially in cases when the enemy, having previously occupied a defensive position, is beforehand with us in his deployment, daring, but not necessarily very risky, attacks of cavalry, supported by flank attacks of small bodies of infantry, may have disastrous effects for our artillery.

"5.—That the Germans, in 1870 were able, without any particular precautions, to develop long lines of guns successfully must be attributed to want of enterprise on the part of the French cavalry and we must not expect similar immunity in future.

" 6.—To the deployment of artillery masses is peculiarly applicable the maxim of Napoleon—'In war nothing can be done without calculation; nothing that is not thought out in the most minute details can be relied on with certainty to produce results.' This deployment is a very complicated matter, requiring much forethought and practice in peace time. Not only must the flanks of the line be protected by fairly strong bodies of cavalry and infantry, but the whole front must be covered by a strong line of skirmishers.

" 7.—As the enemy at this period will not be in a position to employ very large masses of troops against us, the defence of our artillery line need not be of great strength, but it is important that there should be no unprotected gaps in it. Infantry, on account of its slowness of movement, would delay the deployment and, therefore, it is better to use cavalry skirmishers along the front, though they have less power of fire defence.

" 8.—The artillery will be guilty of criminal neglect if in its tactics of the present day sufficient care is not taken to effectually protect the deployment of long lines of guns."

The "Field Artillery Drill of 1896" says in various places:—"On leaving the line of march to advance into action a short halt will usually be necessary in order to collect the batteries.

"The formation will be in line of battery columns.

"When all, or nearly all, the available artillery has arrived the whole of the batteries will advance simultaneously to a previously selected position within medium range."

Vol. II. of the "Cavalry Drill, 1896":—

"The sphere of action of cavalry (in battle) will always be on one or both flanks.!

"The cavalry taking up a position beyond the flanks of a line of battle."

The "Infantry Drill of 1896" says:—"Artillery when covering the advance at long ranges is, as a rule, sufficiently protected and requires no escort."

Presumably in the artillery duel, treating of one army corps at our own establishment, 17 batteries would be engaged, occupying at least 2200 yards of frontage, even if formed in a continuous line.

The "Infantry Drill," p. 147, gives the frontage of an army corps formed for attack as $1\frac{1}{2}$ miles, or 2600 yards, and it is probable that, unless the ground was exceptionally favourable or the guns formed in tiers, the batteries would occupy fully that space.

As a rule there is no difficulty in recognizing approximately the positions which hostile artillery will take up for their first and greatest effort, the artillery duel.

These positions, according to the "Infantry Drill" (p. 116), are covered by the infantry of the advanced guard at a distance of from $\frac{1}{4}$ to $\frac{1}{2}$ a mile.

The preparation for action of so large a force—viz., the interval of time between the batteries leaving their respective columns and the advance into position of the whole mass—would hardly occupy much less than an hour, allowing for the distribution of orders, detailing targets, etc.

During this time the various brigade divisions would be; some waiting in line of battery columns for orders, some moving into this formation from the line of march, some deployed perhaps behind the crest of their position; all of them a considerable distance in front of their main infantry bodies and none of them certainly prepared for sudden action against cavalry the other side of the crest.

Their own cavalry, after the preliminary action of large or small bodies with the cavalry of the enemy, would be drawn off to one or both flanks. Practically the whole defence of the artillery at this time would rest on the infantry of the advanced guard or guards.

It is the period of inaction of the artillery, one might almost say of confusion (for brigade division and battery commanders would, many of them, be separated from the batteries, engaged in reconnoitring or receiving orders), that the Russian writer considers so full of danger to the artillery from unexpected and determined attacks of cavalry, even in small bodies.

The line of infantry defence in front must necessarily be thin and scattered; the rapid advance of small bodies of cavalry is often concealed and the front of artillery is a very long one.

The eventual fate of cavalry making such attacks, if once they reach the artillery position, is of small moment compared to the damage they could do.

The batteries would offer an easy prey to the cavalry wheeling right and left along the position, for the guns could not fire in self-defence without danger to their own side and the main infantry columns in rear would be similarly impeded.

It is to be regretted that even at our largest camp of instruction, Aldershot, there are no opportunities in our army of practising the employment of large masses of artillery in conjunction with a due proportion of other arms. It is true that on more than one occasion the artillery of an army corps (17 batteries) has been collected there during the drill season, but these must necessarily be divided between the two sides at a field-day.

But it has been easy enough, even with such limited opportunities and forces, to learn how many problems there are connected with the new tactical law of employing artillery in masses.

The due protection of the batteries during the deployment seems to be one of these and one worthy the attention, from the opposite point of view, of our cavalry brethren.

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

The Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows:—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are request ed to confine their Essays to about 16 printed pages of the "Proceedings;" other things being of equal brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meet-

ing, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

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List of additions to the Library and Museum during the month of August, 1897.

PRESENTED.	BY WHOM.
Annual reports of H.M. Inspectors of Explosives for the years 1880, 1883, 1888 1889, 1890 and 1896	Inspector of Explosives.
Special Reports on Explosions, Nos. 87 to 124	
Notes on Mountain Artillery Drill	Major J. H. L. Dallas, R.A.
National Defences, by Maj.-General J. F. Maurice, C.B....	The Author.
The Campaign between the Prussians and the Austrians in 1866	Dr. T. M. Maguire, LL.D.
Examination Papers R.M. Academy, Woolwich, June, 1897	The Governor.
Netherlands Artillery Atlas; Plates 117, 118, 125, 126, 127 and 128	Netherlands Government.

MUSEUM.

Shell fired by the Russians during the Siege of Plevna, 1877	W. A. Browne, Esq., LL.D.

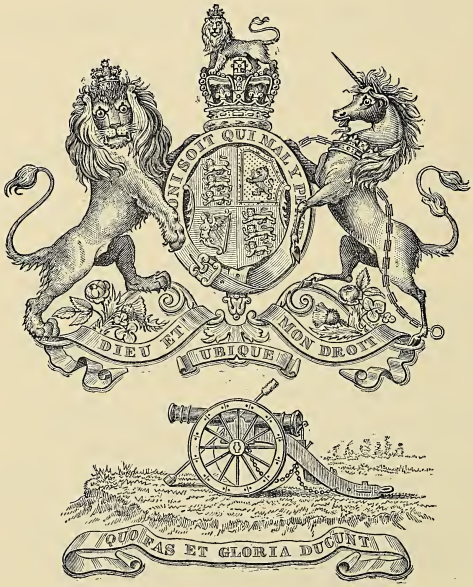
PURCHASED.

Navy Records Society's Publications 1897; "Journal of Sir George Rooke."
L'Etat Militaire de L'Empire Ottoman, ses progrès et sa décadence; par M. Le Comte de Marsigli.
Instructions in Military Equitation and in the elements of Field Movements of Cavalry.
La Guerre Serbo-Bulgare de 1885.
La Campagne de 1866 en Italie. Vols. I. and II., with maps.
Album Militaire. Part IX, 2nd series.
British Central Africa, by Sir Harry H. Johnston, K.C.B.
Naval Gunnery, by Captain H. Garbett, R.N.
Achievements of Cavalry, by General Sir Evelyn Wood, V.C., G.C.B., &c.
Old Memories, by General Sir Hugh Gough, V.C., G.C.B.
Mémoires du Maréchal Marmont Duc de Raguse. Vols. 1 to IX.
Map of Aldershot and surrounding country. Sheets 1 and 2.
Coloured Sketch, "Uniform Royal Artillery, 1799."

The University of Dublin has recently conferred upon an officer of the Regiment, Major P. A. MacMahon, F.R.S., a high and very unusual honour—the degree of Doctor of Science. Unlike the degrees of LL.D. and D.C.L., the degree of D.Sc. rigidly confined to those who have proved themselves to be men of distinguished scientific attainments. Among other flattering remarks in his introductory Latin oration, the Public Orator declared that, although Major MacMahon had devoted himself to Mars, Minerva had claimed him as her own.

The Secretary R.A. Institution will be glad to supply the libraries of various R.A. Messes book-plates like that for Golden Hill, of which a copy is printed below. In writing to order them Hon. Secretaries should state clearly what title, heading, and number of copies they require.

Officers' Library,
Golden Hill, Isle of Wight.



National Association for the Employment of Reserve Men.

The Committee R.A.I. have received the annual report of the above-named Association for the year 1897 and are glad to note the good work therein recorded. In the year 1896 the association found situations for no less than 4916 men, of whom 559 belonged to the R.A. and registered the names of 9151 men. It has 81 branches established in various places in the United Kingdom. Its rules are few and simple; only men of good character are registered and no fees are demanded either from the men or from those who employ them.

It has been suggested that Batteries and Companies of the Regiment at home and abroad would do well to make an annual subscription of £2 or £3 to the Association from their canteen or other funds, instead of giving, as many units have done, handsome donations now and again at intermittent periods. The authority enabling Corps to subscribe from their Canteen Fund is Horse Guards letter 106 | Genl. No. | 136, dated 28th July, 1887. The Central Office of the Association is 12 Buckingham Street, Strand, London W.C.; copies of the Annual Report, Rules, and all information will be gladly supplied on application to the Secretary.

The Committe have agreed to issue from time to time with "Proceedings" lists of situations vacant that are suitable for soldiers either serving or in the reserve or for retired men, also lists of soldiers serving or in the reserve or retired men who want places. Thus, if a man is wanted to be employed in an officers' mess canteen, or sergeants' mess the officer in charge of the establishment wanting him should notify the fact to the Secretary R.A. Institution. In the same way the officer commanding the battery or company should send in the name of any man leaving his command, stating the employment he desires and his qualifications for it.

It is to be clearly understood that the Committee R.A. Institution will in no way hold themselves responsible for the characters either of men or of situations and reserve to themselves the right of refusing to publish any name of man or situation without giving a reason for the same.

Obituary.

Lieut.-Genl. G. Leslie, Colonel-Commandant, whose death has been announced, joined the Regiment as 2nd Lieutenant, 19th December, 1844; became Lieutenant, 1st April, 1846; 2nd Captain, 7th December, 1852; Captain, 2nd November, 1855; Brevet Major, 18th December, 1862; Lieut.-Colonel, 6th July, 1867; Colonel, 6th July, 1872; Major-General, 1st September, 1883; hon. Lieut.-General on retirement, 22nd April, 1887, and Colonel-Commandant, 28th May, 1895.

Captain W. Shipman, who died at Woolwich 5th August, 1897, was commissioned from the ranks as Riding-Master, hon. Lieutenant, 31st December, 1881, and became Captain, 31st December, 1891.

CRICKET, 1897.

ROYAL ARTILLERY *v.* ALDERSHOT DIVISION.

PLAYED AT ALDERSHOT, 26TH AND 27TH MAY.

ALDERSHOT DIVISION.

	1st Innings.		*2nd Innings.*	
R. B. Airey, c C. C. Barnes, b Atkinson	4	c and b H. M. Barnes	17
W. K. Tarver, c H. M. Barnes, b Wigram	13	run out	13
Capt. Oxley, b Atkinson	5	c Waymouth, b H. M. Barnes	60
H. B. Hordern, c Wigram, b Atkinson	2	c Foster, b Wigram	7
Capt. Ruggles-Brise, not out	85	c Waymouth, b Wigram	43
G. H. Thesiger, c Foster, b Wigram	8	b Wigram	0
Capt. Bowen, c and b Waymouth	25	absent	0
Capt. Wilkinson, b H. M. Barnes	0	c H. M. Barnes, b Wigram	8
Capt. Mills, c H. M. Barnes, b Waymouth	0	b H. M. Barnes	2
Capt. Vizard, c Curteis, b H. M. Barnes	1	not out	4
Capt. Shute, c Cairnes, b Waymouth	12	c Waymouth, b H. M. Barnes	5
Extras	8	Extras	3
Total	163	Total	162

ROYAL ARTILLERY.

C. Wigram, st Mills, b Airey	128
C. C. Barnes, c Oxley, b Bowen	17
W. L. Foster, c Airey, b Shute	29
Capt. Dorehill, b Airey	74
J. E. Cairnes, c Mills, b Wilkinson	2
Major Curteis, st Mills, b Wilkinson	107
Capt. Slee, lbw, b Wilkinson	6
H. M. Barnes, b Wilkinson	4
B. Atkinson, st Mills, b Wilkinson	4
F. H. G. Stanton, not out	10
E. G. Waymouth, c Hordern, b Wilkinson	11
Extras	16
Total	408

ROYAL ARTILLERY *v.* ETON RAMBLERS.

PLAYED AT WOOLWICH, 11TH AND 12TH JUNE.

ROYAL ARTILLERY.

	1st Innings.		*2nd Innings.*	
C. C. Barnes, b Chinnery		8	b Chinnery	28
B. Atkinson, b Lord G. Scott		1	b Chinnery	9
J. E. Cairnes, b Chinnery		27	c Hoare, b Lord G. Scott	24
J. G. Austin, b Chinnery		0	b Lord G. Scott	7
Capt. Dorchill, b Lord G. Scott		24	c Farmer, b Chinnery	12
Major Curteis, b Chinnery		28	c and b Hoare	8
H. C. Moorhouse, b Chinnery		0	st Farmer, b Chinnery	13
W. O. Holloway, not out		17	b Chinnery	4
Capt. Usborne, b Lord G. Scott		8	b Chinnery	8
C. A. Sykes, b Chinnery		7	not out	0
Capt. Slee, c and b Ind		0	c Hoare, b Chinnery	0
H. M. Barnes, st Whatman, b Chinnery		1	b Chinnery	7
Extras		18	Extras	9
Total		139	Total	129

ETON RAMBLERS.

C. P. Foley, b Moorhouse	22	not out	57
W. R. Hoare, b Moorhouse	7	st Usborne, b H. M. Barnes	50
Lord George Scott, b Moorhouse	9	c and b H. M. Barnes	24
H. B. Chinnery, b H. M. Barnes	22	c Austin, b H. M. Barnes	0
R. C. Gosling, c C. C. Barnes, b H. M. Barnes	34	b H. M. Barnes	1
A. D. Whatman, b H. M. Barnes	5	st Usborne, b H. M. Barnes	4
F. H. G. Stanton, c H. M. Barnes, b Moorhouse	8	not out	0
H. E. B. Ind, b H. M. Barnes	2		
E. L. Wheeler, not out	2		
G. S. Foljambe, b Moorhouse	0		
H. E. Snagge, b Moorhouse	9		
C. E. Farmer, run out	2	c Usborne, b Moorhouse	1
Extras	6	Extras	6
Total	127	Total (6 wickets)	142

ROYAL ARTILLERY *v.* ROYAL ENGINEERS.

PLAYED AT WOOLWICH, 18TH AND 19TH JUNE.

ROYAL ENGINEERS.

	1st Innings.		*2nd Innings.*	
Capt. Hedley, c and b Moorhouse		11		
Capt. Twiss, c Usborne, b Wigram		8	c Holloway, b H. M. Barnes	5
Major Friend, st Usborne, b H. M. Barnes		7	c Wigram, b H. M. Barnes	8
S. D. Barrow, c Usborne, b H. M. Barnes		55	not out	7
Capt. Burnaby, b Moorhouse		4	not out	15
M. O'C. Tandy, c H. M. Barnes, b Holloway		28		
Capt. Bigge, c Curteis, b H. M. Barnes		22		
T. G. Guggisberg, st Usborne, b H. M. Barnes		4		
G. F. Evans, b Moorhouse		0		
E. H. Rooke, c Kirke, b Moorhouse		28		
Major Druitt, not out		0		
Extras		7	Extras	6
Total		184	Total (2 wickets)	41

ROYAL ARTILLERY.

C. C. Barnes, b Hedley	3	b Hedley	10
C. Wigram, c Rooke, b Hedley	10	b Druitt	27
J. E. Cairnes, b Hedley	8	c Tandy, b Hedley	0
Capt. Dorchill, c Tandy, b Hedley	16	b Hedley	13
Major Curteis, b Rooke	1	c Guggisberg, b Druitt	43
W. O. Holloway, not out	7	b Hedley	0
C. C. Van Straubenzee, c and b Hedley	0	b Burnaby	15
H. C. Moorhouse, c and b Rooke	16	b Hedley	8
Capt. Usborne, c Burnaby, b Rooke	1	c Rooke, b Hedley	6
H. M. Barnes, c Druitt, b Hedley	0	not out	1
K. St. G. Kirke, b Rooke	1	b Hedley	0
Extras	10	Extras	26
Total	73	Total	149

GENTLEMEN OF M.C.C. *v.* ROYAL ARTILLERY.

PLAYED AT LORD'S, 24TH AND 25TH JUNE.

GENTLEMEN OF M.C.C.

1st Innings.		*2nd Innings.*	
L. B. Melville, b Moorhouse	11	b Moorhouse	3
B. N. Bosworth-Smith, b Moorhouse	2	b Wigram	2
H. K. Foster, b Wigram	8	b Wigram	24
W. F. Maude, b Wigram	6	b Moorhouse	0
A. M. Sutthery, c Moorhouse, b Wigram	5	c and b Moorhouse	14
Capt. D'Aeth, st Foster, b Moorhouse	54	b Moorhouse	3
G. F. Vernon, c Allason, b Moorhouse	5	c Moorhouse, b H. M. Barnes	101
Capt. Charles, c Cairnes, b Moorhouse	0	c Wigram, b Moorhouse	15
Lord Henry Scott, c H. M. Barnes, b Wigram	34	c Holloway, b Moorhouse	71
A. E. Leatham, c Allason, b Moorhouse	10	not out	17
Dr. Cobbold, not out	0	c Austin, b Wigram	0
Extras	5	Extras	10
Total	140	Total	280

ROYAL ARTILLERY.

C. Wigram, c Leatham, b Scott	55	not out	70
C. C. Barnes, c Maude, b Scott	36	st Charles, b Maude	13
W. L. Foster, c D'Aeth, b Foster	105	c Charles, b Cobbold	3
Capt. Dorehill, b Sutthery	3		
J. E. Cairnes, b Foster	54		
Major Curteis, lbw, b Foster	23		
W. O. Holloway, c Vernon, b Cobbold	1		
Major Bannatine-Allason, c Vernon, b Cobbold	6		
H. C. Moorhouse, b Foster	29		
J. G. Austin, b Cobbold	2		
H. M. Barnes, not out	0	not out	16
Extras	4	Extras	1
Total	318	Total (for 2 wickets)	103

ROYAL ARTILLERY *v.* YORKSHIRE GENTLEMEN.

PLAYED AT WOOLWICH, 30TH JUNE AND 1ST JULY.

YORKSHIRE GENTLEMEN.

1st Innings.		*2nd Innings.*	
J. A. Aitken, c and b Hinde	1	c Wigram, b Cairnes	6
Hon. C. Lambton, c Usborne, b Wigram	65	st Usborne, b Cairnes	10
F. H. Walker, c Usborne, b Cairnes	29	c Hinde, b Cairnes	0
C. M. Lawson-Smith, b Hinde	24	b Hinde	25
Rev. E. B. Firth, c Waymouth, b Cairnes	14	c Hinde, b Cairnes	6
Capt. G. G. Lang, c and b Cairnes	2	c Wigram, b Cairnes	24
C. W. Landon, b Hinde	27	b Cairnes	7
A. E. Leatham, b Wigram	21	b Wigram	30
E. Lane-Fox, b Cairnes	14	b Hinde	26
J. T. Fairfax, c Crampton, b Hinde	0	c Hinde, b Cairnes	10
R. H. A. Fawkes, not out	0	not out	2
Extras	23	Extras	24
Total	220	Total	150

ROYAL ARTILLERY.

C. Wigram, st Firth, b Lane-Fox	18	c Firth, b Lang	2
V. R. Hine-Haycock, c Fawkes, b Lane-Fox	5	c Firth, b Lang	2
J. E. Cairnes, b Fairfax	73	b Lambton	75
Major Curteis, b Lang	29	b Lang	30
Capt. Usborne, b Lang	31	c Lang, b Lambton	43
E. G. Waymouth, b Fairfax	9	c and b Fairfax	5
Capt. Crampton, c Fawkes, b Lang	0	b Lambton	6
C. E. D. Budworth, b Fairfax	0	b Lambton	0
A. Hinde, b Lang	4	b Lang	7
Major Abdy, b Lang	0	c Fawkes, b Lang	0
C. C. Robertson, not out	0	not out	8
Extras	19	Extras	11
Total	188	Total	186

HOUSEHOLD BRIGADE *v.* ROYAL ARTILLERY.

PLAYED AT BURTON'S COURT, CHELSEA, 2ND AND 3RD JULY.

ROYAL ARTILLERY.

C. Wigram, c and b Quilter	111
V. R. Hine-Haycock, c and b Quilter	26
J. E. Cairnes, b Quilter	16
Major Curteis, c and b Quilter	0
Capt. Usborne, b Studd	1
C. C. Van Straubenzee, c Quilter, b Gosling	55
J. G. Austin, b Quilter	23
Major Bannatine-Allason, b Wentworth	2
Lieut.-Col. Davidson, c Studd, b Quilter	30
Capt. Slee, b Quilter	17
Capt. Crampton, not out	1
Extras	38
Total	320

HOUSEHOLD BRIGADE.

1st Innings.		*2nd Innings.*	
Capt. Wentworth, b Cairnes	17	not out	188
Capt. Heyworth, b Wigram	0	c and b Wigram	17
W. H. Studd, c Wigram, b Cairnes	3	c Austin, b Davidson	112
H. R. E. Harrison, c Allason, b Cairnes	23	c Austin, b Davidson	1
J. A. C. Quilter, b Crampton	54	b Crampton	1
L. C. Garratt, b Crampton	0		
W. S. Gosling, st Usborne, b Cairnes	34	not out	18
C. E. Pereira, c Cairnes, b Haycock	41		
N. R. Wilkinson, c Allason, b Wigram	6		
Sergt. Cumner, not out	14		
Lord Newton-Butler, b Wigram	0		
Extras	5	Extras	12
Total	197	Total (4 wickets)	349

ROYAL ARTILLERY *v.* B.B.

PLAYED AT WOOLWICH, 9TH AND 10TH JULY.

B.B.

1st Innings.		*2nd Innings.*	
Capt. Blair, c Wigram, b Cairnes	12	b Howell	1
R. I. Arbuthnot, b Wigram	30		
E. C. Mordaunt, c Robertson, b Hine-Haycock	15	c Cairnes, b Howell	22
Rev. E. W. Taylor-Jones, c Usborne, b Sykes	10	b Howell	5
Lord Harris, c Usborne, b Hine-Haycock	0	c Usborne, b Cairnes	62
Hon. H. A. Milles, st Usborne, b Cairnes	8		
A. W. Cornwallis, not out	84	not out	21
Capt. Ray, b Cairnes	8	not out	6
S. Christopherson, b Hine-Haycock	28		
F. S. W. Cornwallis, b Wigram	46		
K. Christopherson, absent	0	c Wigram, b Cairnes	6
Extras	44	Extras	19
Total	285	Total (5 wickets)	142

ROYAL ARTILLERY.

C. Wigram, c S. Christopherson, b Mordaunt	74	c Arbuthnot, b Milles	6
V. R. Hine-Haycock, c Harris, b Milles	0	b Milles	15
J. E. Cairnes, b Mordaunt	4	b Ray	56
G. L. H. Howell, b Mordaunt	4	st F. S. Cornwallis, b Mordaunt	0
Major Curteis, b Milles	13	c Ray, b Milles	4
B. Atkinson, b Mordaunt	0	c K. Christopherson, b Mordaunt	73
Capt. Usborne, b Mordaunt	0	b Ray	37
Capt. Slee, c and b Milles	0	c Arbuthnot, b Milles	17
C. A. Sykes, b Milles	14	b Milles	5
G. Laird, b Mordaunt	22	b Milles	28
C. C. Robertson, not out	8	not out	7
Extras	22	Extras	17
Total	161	Total	265

10

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

The Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows:—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are request ed to confine their Essays to about 16 printed pages of the "Proceedings;" other things being of equal brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

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Report on 16th Senior class at the Artillery College	
Regulations for army medical services, 1897	
Hand-book of the German army. (2 copies)	
Appareil de Pointage à Ligne de mire surélevée autobathymétrique du Capitaine Froissart (2 copies)	
Army School Regulations, 1897. (3 copies)	
Standing Orders for Inspectors of Army Schools, Examiners and Teachers, 1897 (3 copies)	
Report on 16th Senior class at the Artillery College. (2 copies)	D.-G. of Military Education.
Annual reports of the U.S. Bureau of Ethnology for 1892–3 (Parts I. and II.) and 1893–4	The Director, Bureau of Ethnology.
Journal of the Iron and Steel Institute. No. 1., 1897	The Council.
"Robert Edward Lee."—An address delivered at the dedication of the monument to General Robert Edward Lee, at Richmond, Virginia, U.S., May 29th 1890. By Archer Anderson	Capt. W. Gordon McCabe.
Special Reports on Explosions. No. 125...	H.M. Inspector of Explosives.
Minutes of "Proceedings" of the Institution of Civil Engineers. Vol. CXXIX. ...	The Council.
Greenwich Magnetical and Meteorological Observations, 1894...	Astronomer Royal.
Report on the part taken by the Royal Artillery in the siege operations, Camp Par; February, 1897	Brigadier-Genl. R.A., Bengal.
Problems in applied Tactics, with solutions	Dr. T. M. Maguire, LL.D.
Manual of saddles and sore backs, &c., 1897	Vet. Major F. Smith, A.V.D.
Règlement sur les manœuvres des batteries Attelées, 1895. Parts I. to V.	Major J. W. Stirling, R.H.A.

MUSEUM.

Red silk sash, as formerly worn by Serjeants, Royal Artillery	G. R. Hunter, Esq.

PURCHASED.

Carnet de L'Officier de Marine, 1897.
Kriegsgeschichtliche Einzelschriften. Parts XXII. and XXIII.
Biologia Centrali-Americana, Zoology. Part CXXXVI.
Monograph of the Paradiseidæ; or birds of Paradise, &c. Part VII.
Album militaire. Parts X. and XI., 2nd series.
Map of North-Western Frontier of India, 1897.
Map of the Yukon Goldfields, N.W. Territories, Dominion of Canada, 1897.
Map of the Nile from Dongola to Khartoum, and of the desert route from Suakin to Berber.
Aide-mémoire de Campagne á l'usage des officiers de reserve D'Artillerie, 1897.
Guide pour l'Instruction sur l'observation des coups, 1897.
Exerzier-Reglement für die Schweizerische Feldartillerie, 1897.
The Regiments of the British army. By R. Trimen, *late* Capt. 35th Foot, 1878.
Military and other poems. By an officer of the army, 1716.
A Narrative of the British Auxiliary Legion. By Alexander Somerville, 1838.
The Military guide for young officers, containing a system of the Art of War. By Thomas Simes, 1776.
The Griffin's aide-de-camp. By "Blunt Spurs."

THE Committee, R.A.I. will shortly send to commanding officers, officers commanding batteries and companies, employed and detached officers a specimen coloured plate of the "History of the Dress of the Royal Artillery" and with it a letter describing the terms of publication and asking officers who wish to subscribe for a copy to fill in a form provided for that purpose. The Committee will be much obliged if everyone who receives a letter will do his best to comply with its requests and send back the form duly filled in at his earliest convenience; in this way the publication of the history will be expedited and members will be in possession of a work that promises to be of exceptional interest and value.

A FAREWELL dinner to the officers of "J" Battery, Royal Horse Artillery, which is under orders to embark for India, was given at the Hotel Dieudonné on the 20th September by the former members of this distinguished battery.

The following were present:—*Officers of the battery*—Major Brunker; Captain Connal; Lieutenants Budworth, Hobson and Cartwright. *Old officers*—Lieut.-General Chamier, C.B.; Cols. Rawlins, Corbett, W. L. Hutchinson, Josselyn, C. W. Thomson, Hebbert, P. Sanderson, C.M.G., Tillotson and W. L. Davidson; Majors Malet, Maberly, Lindsay and Fairholme; Captains Barry, Elton, Calley and Heath.

From "The Engineer."

THE "Engineer" gives a description of an apparatus invented by Mr. Beeton for starting a heavy load by connecting the traction with the circumference of the large wheels of a wagon. I do not propose to give any account of Mr. Beeton's invention, as I do not consider it applicable to military service in general, or even if it be so in some cases, it is certainly unsuitable for artillery. But the account includes a table of forces requisite to move a certain load under varying conditions of road, in which it is shewn that Mr. Beeton's apparatus reduces the effort

from 33 to 53%. I deduce from that table the following comparative figures which will be of interest to Field and Horse Artillery officers and to bicyclists.

F.E.B.L.

Conditions.	Starting Effort Measured by Dynamometer.
Horizontal road (taken as unity)	1
Road inclined at 1 in 68	2
,, ,, ,, 34	2½
,, ,, ,, 17	2¾
Horizontal road, covered with 4 inches of mud	3¾

Obituary.

Lieutenant A. T. Crawford was killed in action in the Momand Valley, 16th September, 1897. He was commissioned as 2nd Lieutenant, 17th February, 1888, and became Lieutenant, 17th February, 1891.

Major E. Dillon (retired), who died at Gravesend, 22nd August, 1897, was commissioned from the ranks as Lieutenant in the Coast Brigade 9th November, 1870; became Captain, 2nd March, 1878, and retired with the hon. rank of Major, 13th March, 1883.

Major R. D. Loudon, whose death occurred at Eastbourne 22nd September 1897, joined the Royal Artillery as Lieutenant, 12th February, 1874; became Captain, 6th July, 1883, and Major, 7th February, 1891.

Lieut.-Colonel H. C. Lyle (retired) died at Reading, 30th August, 1897. He joined the Regiment as 2nd Lieutenant, 11th April, 1854; became Lieutenant, 21st September, 1854; 2nd Captain, 2nd May, 1860; Captain, 1st February, 1871; Major, 5th July, 1872, and retired with the hon. rank of Lieut.-Colonel, 8th June, 1878. Lieut.-Colonel Lyle served in the Crimean campaign from May 1855, including the siege and fall of Sebastopol (medal with clasp and Turkish medal).

Captain M. H. B. Raby, who died at Bath, 21st September, 1897, was first commissioned as Lieutenant, 9th December, 1884, and became Captain, 14th July, 1894.

CRICKET, 1897.

ROYAL ARTILLERY *v.* HARLEQUINS.

PLAYED AT WOOLWICH, 12TH AND 13TH JULY.

HARLEQUINS.

	1st Innings.		*2nd Innings.*	
H. B. Champain, c Slee, b Moorhouse	11	run out	0
A. Page, b Moorhouse	37	c Butler b Begbie	36
T. B. Henderson, b Cairnes	48	b Moorhouse	0
R. T. Jones, b Butler	49		
B. D. Bannon, b Cairnes	36	b Butler	25
A. J. Webbe, c Cochrane, b Cairnes	3		
C. R. Seymour, c Butler, b Cairnes	5		
J. R bertson-Walker, b Cairnes	1		
W. E. W. Collins, b Cairnes	16	not out	29
J. W. Stocks, c Curteis, b Cairnes	0		
R. W. Fox, not out	1	not out	6
Extras	23	Extras	12
Total	230	Total (4 wickets)	106

ROYAL ARTILLERY.

Captain Slee, b Collins	24	c Collins, b Henderson	19
G. Laird b Stocks	5	c Fox, b Henderson	0
J. E. Cairnes, b Collins	4	c Stocks, b Henderson	38
H. C. Moorhouse, c Stocks, b Collins	17	c Fox, b Henderson	3
A. R. G. Begbie, c Stocks, b Henderson	16	b Henderson	21
Major Curteis, l-b-w, b Collins	5	c Collins, b Stocks	57
V. R. Hine-Haycock, not out	5	b Stocks	9
C. C. Robertson, b Stocks	1	run out	5
Sergt.-Major Cochrane, b Stocks	7	c Webbe, b Henderson	29
Bomb. Butler, c Stocks, b Henderson	20	not out	5
Captain Stokes, b Stocks	1	run out	0
Extras	18	Extras	25
Total	123	Total	211

ROYAL ARTILLERY *v.* BUTTERFLIES.

PLAYED AT WOOLWICH, 16TH AND 17TH JULY.

ROYAL ARTILLERY.

1st Innings.		*2nd Innings.*	
C. Wigram, b Christopherson	8	b Lytton	73
Captain Slee, b Lytton	35	b Mordaunt	10
J. E. Cairnes, c Stobart, b Christopherson	16	b Mordaunt	42
A. R. G. Begbie, c Cobb, b Christopherson	15	c Cobb, b Smith	25
Major Curteis, b Christopherson	9	b Mordaunt	30
Lt.-Col. Davidson, b Lytton	14	c Smith, b Leslie	0
H. C. Moorhouse, b Christopherson	0	b Leslie	3
Sergt.-Major Cochrane, c and b Christopherson	9	b Lytton	1
V. R. Hine-Haycock, b Lytton	22	c Watney, b Christopherson	8
C. C. Robertson, not out	46	c and b Mordaunt	49
Major Leslie, b Mordaunt	10	not out	0
Extras	7	Extras	27
Total	191	Total	268

BUTTERFLIES.

S. K. M. Stobart, c Moorhouse, b Cairnes	5	c Hine-Haycock, b Moorhouse	15
H. J. Mordaunt, b Wigram	141	not out	4
A. Whatman, c Moorhouse, b Wigram	5		
Hon. N. Lytton, c and b Moorhouse	3		
C. F. H. Leslie, c Wigram, b Hine-Haycock	65	c Begbie, b Moorhouse	15
C. E. Cobb, b Moorhouse	4	b Wigram	52
D. Christopherson, c Davidson, b Cairnes	1		
H. S. M. Stutfield, c Wigram	12		
F. D. Watney, c Cochrane, b Moorhouse	4	not out	97
V. H. Smith, b Wigram	4		
A. L. Onslow, not out	0	b Wigram	2
Extras	15	Extras	18
Total	259	Total (4 wickets)	203

ROYAL ARTILLERY *v.* ROYAL ENGINEERS.

PLAYED AT CHATHAM, 23RD AND 24TH JULY.

ROYAL ARTILLERY.

C. Wigram, c Rawson, b Druitt	44
W. L. Foster, st Rawson, b Druitt	87
Capt. Dorehell, b Hedley	1
J. E. Cairnes, b Hedley	18
Capt. Stockdale, c Rawson, b Rooke	25
G. P. C. Blount, b Druitt	22
Major Curteis, l-b-w, b Guggisberg	43
Capt. Usborne, b Hedley	7
H. C. Moorhouse, c Tandy, b Guggisberg	48
A. Hinde, not out	12
H. M. Barnes, b Hedley	14
Extras	29
Total	350

ROYAL ENGINEERS.

1st Innings.		*2nd Innings.*	
Major Rawson, c Foster, b Wigram	3	not out	9
Capt. Twiss, b Wigram	57	c Foster, b Wigram	5
Capt. Bigge, b Moorhouse	4	b Moorhouse	0
Col. Renny-Tailyour, c Hinde, b Wigram	42	b Moorhouse	8
Capt. Hedley, b Wigram	21	c Foster, b Moorhouse	41
F. G. Guggisberg, b Moorhouse	8	c Foster, b Wigram	18
M. O'C. Tandy, b Wigram	5	c Blount, b Barnes	29
G. O. Bigge, c Cairnes, b Barnes	36	c Wigram, b Moorhouse	21
C. B. Symons, b Wigram	1	b Barnes	0
E. H. Rooke, c Moorhouse, b Wigram	1	c Hinde, b Wigram	1
Major Druitt, not out	2	c Blount, b Barnes	7
Extras	26	Extras	4
Total	206	Total	143

ROYAL ARTILLERY *v.* FREE FORESTERS.

PLAYED AT WOOLWICH, 30TH AND 31ST JULY.

ROYAL ARTILLERY.

1st Innings.		*2nd Innings.*	
Capt. DuCane, c Quinton, b Wells	4	c Quinton, b Wells	6
Capt. Slee, b Stevenson	10	b Collins	5
J. E. Cairnes, b Stevenson	0	b Wells	0
C. C. Van Straubenzee, b Roberts	53	b Wells	1
C. C. Robertson, c Wauchope, b Stevenson	6	c Stevenson, b Wells	6
Major Curteis, c Wells, b Collins	28	b Wells	18
Major Bannatine-Allason, c Elliot, b Wells	48	c and b Stevenson	29
F. H. G. Stanton, c and b Wells	60	b Wells	0
C. A. Sykes, b Wells	4	st Headlam, b Wells	0
H. M. Barnes, not out	1	c Elliot, b Wells	3
V. R. Hine-Haycock, c Stevenson, b Wells	1	not out	0
Extras	4	Extras	7
Total	219	Total	75

FREE FORESTERS.

J. M. Quinton, b Sykes	14	c Straubenzee, b Cairnes	0
T. V. Garnier, b Skyes	14	c Straubenzee, b Hine-Haycock	12
C. M. Wells, c and b Skyes	0	c Straubenzee, b Stanton	32
H. J. Stevenson, l-b-w, b Sykes	13	not out	24
A. R. Don Wauchope, b Sykes	41	not out	13
H. H. Prince Christian, st Straubenzee, b Barnes	32		
A. W. Roberts, b Cairnes	34		
W. E. W. Collins, b Barnes	1		
Major Elliot, c Robertson, b DuCane	10		
Capt. Fraser, run out	13		
C. Headlam, not out	19		
Extras	15	Extras	10
Total	206	Total (3 wickets)	91

ROYAL ARTILLERY *v.* OXFORD UNIVERSITY AUTHENTICS.

PLAYED AT WOOLWICH, 2ND AND 3RD AUGUST.

ROYAL ARTILLERY.

1st Innings.		*2nd Innings.*	
C. Wigram, c Henderson, b Corbett	34	c Henderson, b Morris	43
Capt. Wynne, b Quinton	7	b Henderson	62
J. E. Cairnes, b Corbett,	34	c Corbett, b Henderson	0
W. O. Holloway, b Henderson	14	b Corbett	29
G. P. C. Blount, b Henderson	29	c Corbett, b Henderson	19
Major Curteis, b Morris	29	not out	63
Capt. DuCane, run out	59	c Corbett, b Henderson	19
F. H. G. Stanton, b Corbett	13	c Corbett, b Henderson	3
Capt. Slee, c Johnson, b Corbett	20	c Henderson, b Corbett	35
C. C. Robertson, b Henderson	16	c Corbett, b Henderson	9
H. M. Barnes, not out	2	c Bannon, b Hunt	3
Extras	22	Extras	10
Total	279	Total	305

OXFORD UNIVERSITY AUTHENTICS.

H. T. Stanley, c and b Cairnes	28	b Cairnes	15
A. Page, c and b Wigram	8	c and b Barnes	9
B. D. Bannon c Slee, b Wigram	7	c and b Holloway	44
T. B. Henderson, c DuCane, b Wigram	6	b Holloway	0
G. R. Hunt, st Slee, b Barnes	0	b Holloway	13
E. R. Morres, not out	139	not out	22
J. L. Johnson, b Blount	16	b Holloway	1
H. D. Corbett, c and b DuCane	22	st Slee, b Cairnes	11
A. C. Taylor, b Wigram	10	not out	0
J. M. Quinton, b Holloway	1	b Holloway	0
J. A. Fort, b DuCane	16	b Barnes	5
Extras	37	Extras	18
Total	290	Total (9 wickets)	138

ROYAL ARTILLERY *v.* I.Z.

PLAYED AT WOOLWICH, 4TH AND 5TH AUGUST.

I.Z.

1st Innings.		*2nd Innings.*	
G. V. Vernon, c Blount, b Wigram	0	c Cairnes, b Wigram	3
R. H. Mitchell, c Barnes, b Wigram	45	c and b Barnes	28
H. B. Chinnery, c Slee, b Cairnes	8	c Foster, b Wigram	10
F. W. Maude, c Cairnes, b Wigram	0	c and b Wigram	2
Hon. H. A. Wells, b Wigram	0	c Blount, b Wigram	5
E. C. Mordaunt, c Foster, b Cairnes	5	c Wigram, b Barnes	45
W. Morgan, c Holloway, b Wigram	8	c Wynne, b Barnes	11
A. Power, c Curteis, b Cairnes	0	c Holloway	69
E. M. Dowson, b Wigram	6	b Wigram	3
R. W. Mitchell, c Cairnes, b Wigram	3	b Holloway	2
Lt.-Col. Davidson, not out	2	not out	3
C. C. Clarke, c Foster, b Wigram	11	b Wigram	46
Extras	5	Extras	2
Total	93	Total	229

ROYAL ARTILLERY.

C. Wigram, c Davidson, b Mitchell	87		
W. L. Foster, c and b Mitchell	30		
Capt. DuCane, b Dowson	32	not out	1
J. E. Cairnes, c Vernon, b Dowson	107		
W. O. Holloway, b Dowson	0		
G. P. C. Blount, b Mordaunt	8		
Capt. Wynne, b Dowson	14		
Major Curteis, c Maude, b Dowson	3	not out	0
Major Bannatine-Allason, not out	5		
Capt. Slee, c Dowson, b Mordaunt	3		
H. M. Barnes, st Clarke, b Dowson	21	run out	1
C. E. D. Budworth, b Dowson	0		
Extras	12		
Total	322	Total	2

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

THE Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows:—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings;" other things being of equal brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meet-

ing, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

The following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Notes of Lectures on Artillery in Coast Defence," by Major A. C. Hansard, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*) and (*e*) set in the five examinations ending November 1895:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

Lithographic plates of Field Artillery Harness shaft draught stripped and laid down for inspection, price for pair (lead and wheel), 1d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

The R.A. Institution have acquired from Mr. Murray the entire remains of Duncan's "History of the Royal Artillery," 3rd Edition, as published by him in two volumes in 1879. These are available for purchase by members at the small charge of eight shillings a copy, bound in blue cloth and, as the stock is not large, supply will be made in the order in which applications are received.

List of additions to the Library during the month of October, 1897.

PRESENTED.	BY WHOM.
Coloured Lithographs R.C.D. 239, R.L. 241 and 247	Secretary of State.
Treatise on Ammunition, 1897	
Report on the Sixteenth Senior Class at the Artillery College	Director Artillery College.
Record of Transactions, Institution of Junior Engineers. Vol. VI., 1895–6	The Council.
The Official Catalogue, Royal Military Exhibition, 1890	Major G. E. W. Malet, late R.A.
Official Report of Hon. Director, Royal Military Exhibition, 1890	
The late Royal Military Exhibition and its value from a military point of view. (Reprint from Royal United Service Institution Journal)	
Accessions to catalogue of books and maps in the library of the Egyptian War Office, 1894–6	Lt.-Col. F. R. Wingate, C.B., D.S.O
The Game of Invasion; invented by Lieut. H. Chamberlain, R.N.	Lieut. H. Chamberlain, R.N.
Relation circonstanciée de la dernière campagne de Buonaparte, terminée par la bataille de Mont-St.-Jean, dite de Waterloo ou de la Belle-Alliance	Capt. A. B. Denne, R.A.

PURCHASED.

The life of General Sir Howard Douglas, Bt., G.C.B. &c., &c.

Notes of a Naturalist in the Nile Valley and Malta.

Frederick II. and his times. By Frederick von Raumer.

The Art of Gunnery. By Nathanael Nye.

Dictionary of National Biography. Vol. LII.

Seven Campaigns in the Peninsular. By J. S. Cooper.

La Péninsule Normande dans la défense de la France.

Dissertations sur la guerre Turco-Grecque.

Adventures in the Rifle Brigade in the Peninsular, France and the Netherlands, from 1809 to 1815. By Captain J. Kincaid. 1830.

Home Service; or scenes and characters from life at out and head-quarters. By Benson Earle Hill, 1839.

Up among the Pandies; or a year's service in India. By Lieutenant Vivian D. Majendie, R.A. 1859.

Dictionnaire Militaire. Part 10.

Biologia Centrali-Americana: Zoology. Part 137.

The Hakluyt Society's Publications 1897, "Danish Arctic Expedition 1605–20, Vols. I. and II.

Major R. H. Murdoch, R.A., Assistant Superintendent, R.A. Records, is engaged on the "Memoirs Historical and Biographical" of the family of Desaguliers; he will be much obliged if anyone can give him information as to the representatives of this family at the present day.

Royal Naval Review, Spithead, 26th June, 1897.

After closing the accounts in connection with the R.A. Steamer at the Naval Review, the Balance Credit was found to be £56 17s. 0d.

This amount has been handed over to the Secretary, R.A. Charities, Woolwich.

N. D. FINDLAY, Major, R.A.
E. W. BLUNT, Captain, R.A.

Camberley,
September, 1897.

BERMUDA.

A few notes on recent events in the small sporting world of the small Island of Bermuda, may possibly afford some interest to officers of the Regiment, who have at one time or another, been quartered there. It is proverbially a place where nothing ever happens, and, no doubt the chronicle of this small beer may assume undue proportions in the eyes of the Bermuda gunners of the moment. Still the place is usually belied—it could scarcely be belittled—at home, and those who know it, may have sufficiently tender recollections of its amusements in the past, to tempt their attention to some of its doings in the present.

The Bermudas, or Somers', or Summer Isles, as they are sometimes not unreasonably called, are a chain-dotted line of Coral reefs, somewhat resembling in shape a Bishop's crozier, of which St. George's forms the butt end, and Ireland Island, the tip of the crook. From time immemorial St. George's has been regarded as the head-quarters of the gunners. In March last, one company was moved to Ireland Island, there to be stationed permanently. This was a blow to the mess, and to the R.A. as an athletic entity. St. George's and Ireland Island are only ten miles apart, in point of distance as the crow flies, but in point of time, as wide asunder as the poles; and in 1897, for the first time for many years, no Regimental Sports could be held.

The sports of the Leinster Regiment, however, took place about the second week of April, and the greatest interest was taken in the tug-of-war, open to the Garrison and Fleet, owing to the Leinster team (who arrived here with a great reputation) being beaten in 1896 by the gunners—the Irishmen naturally thirsted for revenge. Both teams were highly trained for what was regarded as the return pull; Sergeant Walden, 3 Company, Western Division, got his men into splendid condition for this occasion. The Fleet—blue jackets, marines and stokers—and the R.A. 2nd team were soon disposed of and "Gunner Greek met Leinster Greek" in the semi-final. After a grand struggle, the R.A. won by two pulls to love and easily beat the 2nd team of the Leinsters' in the final. Our men averaged 13 st. 2½ lbs.; the Leinsters', 13 st. 6⅓ lbs. The open mile at these sports was won easily by Trumpeter Walker. At the naval sports, the R.A. team again beat the Leinsters' in the open tug-of-war—this time easily—and Trumpeter Walker won the open mile in 4 min. 55 sec., with no one to press him and fully 50 yards to spare. In all athletic sports—Naval, R.A., R.E. and Leinsters'—in the two seasons, 1896–97, every event open to N.C.O.'s and men of Garrison and Fleet has been won by the R.A., including 5 tugs-of-war, the final of each being contested by a Leinster team.

Some good sport at sea fishing has been obtained by Captain Thornton, R.A., who, since February 1897, has caught, among others, 23 fish each, over 70 lbs. weight, the largest being 90½, 85, 82 and 79 lbs. each. They were mostly caught close inshore from a dinghy boat by means of big (and high) bait, thick line, great patience and wiley artifice. Many more equally heavy were hooked and are still to be seen by R.E. divers of the S.M. company with hooks in their mouths in the same neighbourhood. Captain Thornton is our piscatorial professor. By visiting the neighbouring continent during the early summer, excellent salmon and trout fishing can be obtained, and during three weeks in Canada in July and August of this year Colonel Dalton got 18 salmon in the Bonaventure river weighing 34, 27, 23, 21, 20 and down as low as 9 lbs. all on the fly. Sea trout in those parts (which run up to 5 lbs.) are considered too plentiful by those fishing for salmon, but come in very useful all the same. The largest Colonel Dalton got was 3½ lbs.

Since 3 and 19 Coys., Western Division, arrived, a 9-hole golf course has been opened, and, chiefly owing to Major Marston's efforts, has been well kept and much improved, and has been a great source of amusement and even excitement when tournaments and matches with the rival club at Ireland Island have been arranged. The record for the 9-holes is held by Major Anderson, R.A., who has done the round in 33. The finest performance for the 18-holes was that of Lieutenant Goldfinch, R.A., who completed the double round in a match in 76. The R.A. and R.E. Games' Funds were both kind enough to contribute towards the maintenance of the links and the erection of a shed, which is dignified locally by the name of a pavillion.

Lawn tennis and squash racquets are both patronized. For the former there is one lady's day a week with tea in the pavillion.

In 1895 a football league was started, opened to Companies, R.A., R.E. and the detachment of the line regiment stationed at St. Georges. The cup—a work of art executed by the Army and Navy Stores—has been played for twice, and twice won by the R.A., in '95 by No. 3, and in '96 by No. 19 Coy., which now holds it.

Jubilee day was celebrated on June 22nd, and the R.A. battalion, under Lieut.-Colonel Dalton (including the Bermuda Militia Artillery, or "Black Watch") led the march past, preceded by the drums and fifes of 19 Coy. A service was afterwards held in the cathedral at Hamilton and a reception by H.E. the Governor and Mrs. Barker in the afternoon. In the evening a grand military tattoo was performed by the bands of the Leinster Regiment, R.A. and volunteers, succeeded by a torchlight procession and illuminations of the town and yachts in the harbour.

When Colonel Morgan left, in December '96, the Command of the R.A. devolved upon Major Marston, until the arrival of Colonel Dalton, on the 21st April. Captain (now Major) Gardiner and Captain Simonds have both left since, and their successors, Captains Levita and Ross-Johnson have not yet joined.

The strength of the R.A. is shortly to be increased to two double Companies, at St. George's and one at Ireland Island. No. 8, Southern Division, will arrive here shortly to relieve No. 19, Western, which goes to Halifax. This will necessitate enlargement of the R.A. and R.E. mess; the sergeants' mess has already been enlarged.

The topographical limitations of the Bermudian rock-patches preclude polo. Even an enthusiast would scarcely wish to play on the hard high road which meanders from end to end of the colony; moreover, a bad swerve off, it would precipitate pony and rider into the sea. And hunting is necessarily not a feature of the place. There is nothing to hunt except land crabs, which afford more

sport for terriers than for their masters. Nor is there anything to shoot smaller or more lively than barrels and record targets, though plover and snipe are supposed by the sanguine to exist. Still, a race-course, like the ragged rascal in the alliterative nursery rhyme, runs round and round a rugged rock at Shelley Bay and it is quite safe to bet on the only favourite of the "turf"(?)—and will be till he dies! Then again, there are less pleasant occupations in the world than picnic parties to desert islands in charming society on moonlight nights or otherwise (and our society takes no less pride in its own than in the moon's charms); or than rowing hard in a five-oared gig, or leisurely in a skiff, on water whose lovely colours defy word painting; or than bathing in its luke-warm beauty, morning, noon or night, without the slightest chance of catching cold; or than sailing your own boat or someone else's boat, with your own or someone else's best girl, under the brilliancy of skies, or in the glow of sunsets which would be the despair of artists, were there any about—and of sailing there is literally no end. Bermuda has been regularly accepted as a winter health resort by our cousins on the American continent, and we are invaded every winter now by a host of fair Americans, who brighten and enliven society in and about Hamilton and who seem thoroughly to enjoy our "perpetual spring," whilst escaping the rigours of winter in their own country. Oh, yes; we may not be believed, but these rough rocks and coral clusters, to which we here are grateful for some really pleasant years, may be called small and even insignificant; and, cut off from the greater world by many miles of sea, they may perhaps be overlooked by those "awaiting orders" in their general contemplation of the scheme of foreign service; and when those orders come, the isles, poor things, may even be confused with the West Indies and remain unheard of and unknown until identified upon the map; yet, when once found and seen, they certainly are beautiful, and taken the right way, extremely pleasant too.

MALTA.

Royal Artillery Annual Aquatic Meeting.

The Annual Aquatic Sports of the Artillery Brigade took place on Wednesday and Thursday 15th and 16th September at the Hay Wharf, Quarantine Harbour, and were witnessed by a large number of Officers, Warrant Officers, N.C.O.'s and men of the Brigade, their families and friends.

On the second day of the sports, His Excellency the Governor, who was attended by Captain Harding, A.D.C., was present and took the opportunity to present the Holman Shields for Rowing and Cricket, to the Companies which had won them.

Three handsome Silver Challenge Shields one each for Rowing, Cricket and Football have been presented to the Royal Artillery at Malta by the relatives of the late Lieut. B. W. Holman, R.A., A.D.C., in accordance with that Officer's wishes, with the object of promoting the welfare of the Royal Artillery soldiers in Malta (more especially the younger). These shields will remain at Malta as a permanent memorial to the late Lieut. Holman, who during his life in the service took the greatest interest in the welfare of the men and in their sports and games. The shields are to be competed for annually, the present year being that in which they were inaugurated.

The Rowing and Cricket Shields have been competed for during the past summer, the Football Shield will be competed for in the course of the forthcoming winter.

On arrival at the Hay Wharf, His Excellency was received by Lieut.-Colonel de C. Daniell, Commanding Artillery Brigade, and Lieut. Colonel Bernard, Com-

manding R.M.A. The winning teams were drawn up in the Officers' enclosure, and H.E. examined the shields with great interest.

Lt.-Col. Daniell then said: "Your Excellency—the Officers, N.C.O.'s and men of the Royal Artillery at Malta are very grateful to you for your kindness in having come here this afternoon to present the Holman Challenge Shields for Rowing and Cricket to the winning teams; we fully recognise the great compliment you have paid us in being present on this occasion.

These shields have been of great benefit to the men, promoting keen healthy competition in the Sports mentioned.

The Holman Challenge Shield for rowing was won by No. 29 Co. Southern Division, R.A., No. 16 Co. Southern Division, R.A., being second, after a very good race in which 8 started.

The Holman Challenge Shield for Cricket was won by No. 5 Co. Eastern Division, R.A., No 26 Co. Southern Division, R.A., being second.

No. 5 Co. Eastern Division, R.A., arrived a year ago in Malta from Gibraltar, and won all the matches in which it played; great credit is due to the Captain of the Team.

The greatest interest in the matches was taken throughout by all Companies.

I now ask Your Excellency to be so kind at to present the Shields to the winning teams."

His Excellency then said:—

"Lieut.-Colonel Daniell, Officers and men of the Royal Artillery; it gives me great pleasure on this occasion to hand over the Holman Challenge Shields for Rowing and Cricket to the winners, No. 29 Co. S.D.R.A. and No. 5 Co. E.D.R.A. the more so as it gives me the opportunity of testifying my affection and regard for the gallant and promising young officer whose premature death is deplored by all his friends. I rejoice to think that by means of the Holman Shields his memory will for ever endure in Malta, as a zealous efficient Artillery Officer, a true friend, and a perfect gentleman."

His Excellency then presented the Shields to the Captains of the boats-crew and cricket team amidst loud cheers from the spectators.

The Royal Artillery have just won the Cricket Cup at Malta for the first time.

Eight teams were entered, our opponents being the West Ridings, H.L.I., and Worcesters, the first of whom we beat by 10 wickets, the second by 29 runs after a very hard tussle, and the third in the final by 269 runs.

The fine batting of Lieut. Bignell contributed very largely to our success, as, for the five innings played, he had an average of 112.

Gunners Traynor and Cross got most of the wickets. The former, a very fast left-hand bowler, who gets a good deal of work on, will be well worth watching next year, as he goes home with his company (30 Co. S.D.R.A.) to Portsmouth in January next.

The R.A. XI. consisted of Lieuts. H. Robinson (capt), B. H. Bignell and F. M. Rickard; Sergeants Williams and Gilbert; Bombardiers Sutton and Corbett; Gunners White, Moore, Cross, Traynor and Dalby.

In polo we are doing fairly well, winning most of the matches we play. At this time of the year, however, we play principally 'Castille' (R.A. and R.E.) games for the benefit of beginners.

In July a team of R.A. subalterns won the Annual Handicap Tournament, winning the three matches they had to play pretty easily. The team was:—

1. W. E. Clark.
2. H. Robinson (capt).
3. J. Farquhar.

D. E. Forman.

The R.A. Polo Club, which was started on the 1st of May last, is a great success, and all young officers are advised, when ordered to Malta, to come out prepared to play the game, it is now, practically speaking, within the means of all.

Great credit is due to Lieut. D. E. Forman, R.A., the capable and energetic secretary, for the good work he has done in forming this club.

N.W. Frontier, India.

THE following interesting notes are extracted from a letter written by a subaltern officer of a Native Mountain Battery; they well describe the rough work and long marches for the brilliant performance of which these Batteries are so deservedly famous :—

WE left Kohat on 20th August, for Hangu, at the foot of these hills. We spent the first week in inactivity and rain, since when we have been marching and counter-marching to our hearts' content, chiefly forced marches, with lots of discomfort and without very much object. My section has been alone a good bit of the time, as I left Hangu on 30th August, with the 15th Sikhs.

We came in touch with the enemy at the end of a 23 mile march, starting at 6 a.m., but after a few rounds from dismounted cavalry and 4 rounds from my guns they evaporated. All the same they made some very useful practice, sniping at our mess table the same evening, sending 2 or 3 shots right between us. We marched from this place, Doaba, to Sadda (the march short of Parachinar, Kurram), 48 miles in 46 hours and arrived in time to prevent an attack there by 3000 of the enemy who cleared out on hearing of our approach. Our other two guns arrived 2 days later and we imagined ourselves a fixture there until the advance into Tirah was started. However, 3 or 4 days later the 4 guns were ordered back to Thal, no reason being given and, after spending a day and a half there, an urgent wire came ordering us back to Hangu as fast as possible as an attack on the camp was expected.

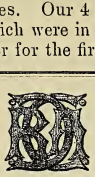
We left Thal at 5 p.m., leaving Hangu at 5.5 a.m., next morning, 35½ miles in 12 hours, which is pretty fair travelling, isn't it? We did the whole 71 miles from Sadda to Hangu, in 70 hours, but of course the first part we only did in 2 ordinary marches and halted 26 hours at Thal. We arrived without a stitch of kit except our great coats and I did not get out of my clothes for 4½ days. We started up the hill at mid-night on the 13th and engaged the enemy on top about 7 a.m. At our first position we had a warmish time at first, as we were fired at from a hill 500 yards off, but though we had bullets in plenty among us not a man or a mule was touched.

We made some rather pretty practice at a tower 1000 yards off, putting 4 out of the first 5 shell into it and setting it on fire. The Gurkhas finished turning out the enemy and then we came on here, Fort Lockhart, Samana, and from a position a couple of hundred yards in front of the fort, we shelled the enemy round the "Seragarhi" post which they had taken 2 days before. We drove them out of this before our infantry could get a look in. We then moved on and fired on the enemy retreating from round Gulistan Fort which had been rather hard pressed, but unfortunately it was a longish range, 3500 yards; however they ran like hares and we must have hit a certain number.

We managed to do for 2 of our guns in the course of the day, the junction nut of one of mine cracked and another gun fell down the hill, from shock of recoil, at the last position, which was on *very* bad ground and got the sight socket knocked in.

We got through 108 rounds during the day and really most of the show we had to ourselves. I went on with my 2 guns to Gulistan Fort where we stayed

3 days, making only one reconnaissance during that time, but finding no enemy who have cleared away some 20 miles. Our 4 guns are now here and likely to remain some time, the other 2, which were in Kurram, are now at Sadda and we hope eventually to get all 6 together for the first time for 6 years.



CRICKET 1897.

Results: 13 played, 5 won, 6 lost, 2 drawn.

BATTING AVERAGES.

Name	No. of runs	No. of innings	Times not out	Most in innings	Averages
Mr. W. L. Foster	251	4	0	105	62 75
Mr. C. Wigram	790	16	1	128	52·66
Major F. A. Curteis	571	21	1	107	28·55
Mr. J. E. Cairnes	542	20	0	107	27·1
Capt. C. C. Van Straubenzee	124	4	0	55	24·8
Captain J. P. DuCane	120	5	0	59	24
Mr. C. C. Robertson	161	12	5	49	23
Major R. B. Allason	90	5	1	48	22·5
Mr. F. H. G. Stanton	86	5	1	60	21·5
Captain P. H. M. Dorehill	143	7	0	74	20·42
Mr. G. P. C. Blount	78	4	0	29	19·5
Mr. A. R. G. Begbie	77	4	0	25	19 25
Mr. B. Atkinson	87	5	0	73	17·2
Mr. C. C. Barnes	115	7	0	36	16·3
Captain P. H. Slee	211	14	0	35	15·1
Captain T. M. Usborne	147	10	0	43	14·7
Mr. G. Laird	55	4	0	28	13·75
Mr. H. C. Moorhouse	137	10	0	48	13·7
Mr. W. O. Holloway	72	8	2	29	12
Sergeant-Major Cochrane	45	4	0	29	11·25
Mr. V. R. Hine-Haycock	93	11	2	26	10 33
Mr. H. M. Barnes	73	13	5	21	9·12
Mr. J. G. Austin	32	4	0	23	8
Mr. C. A. Sykes	30	6	1	14	6

Obituary.

Major A. Burton died at Peshawur 27th September 1897. He joined the Regiment as Lieutenant, 29th April 1873; became Captain, 16th September 1882, and Major, 28th March 1890.

Lieutenant W. H. Ramage-Dawson, who died at Hong Kong 27th September 1897, was first commissioned as Second Lieutenant 16th May 1891, and became Lieutenant 16th May 1894.

Lieutenant R. St. C. Harman, who died at Peshawur on 11th October 1897, was commissioned as 2nd Lieutenant 14th February 1890 and became Lieutenant 14th February 1893.

PRÉCIS
AND
TRANSLATION.

"REVIEW."

NOTES ON MOUNTAIN ARTILLERY.

BY

COLONEL D. MANUEL SALAZAR,
Of the Spanish Artillery.

REVIEWED BY

LIEUT.-COLONEL J. C. DALTON, R.A.

As the author says in his preface, the main object of this book is to reunite in one small volume a number of odds and ends of information and practical details which many of them could not well be included in the tactical regulations, and that this book is meant, therefore, to act as a supplement to the latter.

As he says, the Mountain Artillery in Spain is in peace-time kept at a very low establishment, and of late there have been in the entire Peninsula only two regiments and a few batteries in Cuba and Phillipines. Therefore, as it would be necessary greatly to augment this branch of the Regiment in case of war, Colonel Salazar thinks it advisable to collect in a small compass a number of precepts and useful details as to Mountain Artillery and has arranged them with regard to not only the regulation batteries of six guns but to sections of two guns and batteries of four guns—such as now exist in Cuba.

Spain may be said to be the natural home of Mountain Artillery. Both its conformation (in many parts) its climate, its inhabitants and even its want of carriage roads make it peculiarly suitable for pack transport. It breeds a splendid race of mules and the nation thoroughly understands the mule and his management. Therefore, any treatise on Mountain Artillery by Spanish officers who devote themselves specially to this arm, is pretty sure to be worth study.

Colonel Salazar, who commands a regiment of Mountain Artillery at Barcelona, is a recognised authority on the subject and writes from long experience.

He divides his work into ten chapters and an appendix.

Chapter I. deals with 'general considerations' as regards *matériel* and *personnel*, loads, mules, organisation and instruction. He lays down the following conditions for Mountain Artillery, viz :—

Gun to have a simple breech-action capable of rapid loading. Maximum weight to be 100 k.g. (220 lbs.).

Calibre (maximum) 3″.

Carriage to be of simple and resisting elements, easy to load and unload and with a maximum weight of 170 kil. (375 lbs.).

Projectiles all of equal weight and not exceeding 8·9 kil. (10 lbs.).

Ammunition Boxes.—Sufficiently strong to stand knocking about and falls. Maximum weight when full, 56 kil. (123 lbs.).

Stores.—Everything necessary to replace all parts of the system which may become ineffective should be carried, sufficient for one or two months.

Provisions.—Forage and rations for two or three days should be carried.

Tools and ironwork for executing all necessary repairs and fittings must also be taken.

Pack Saddles.

Artillery pack-saddles must fulfil the following conditions :—

(1). Not to gall the animals.

(2). To be stable so that the loads shall not oscillate.

(3). Its weight not to exceed what one man can easily manipulate.

(4). The materials composing it must not easily deteriorate and in case of damage it should be readily capable of being repaired.

(5). That the attachments of the loads should be simple and produce a rigid connection between them and the pack-saddle.

(6). That it should serve equally well for all loads.

The author then goes carefully into the essential conditions for each of these requirements in turn and, as the Spanish nation especially excels as regards pack-saddlers, all the conditions and hints given by the author on this subject are well worthy of study.

Animals.

The best for Mountain Artillery is the mule. They should have a good appearance, bull neck, deep and wide chest, sound and clean limbs, large knees and hocks, straight back and deep ribs. The height should be 5 ft. to 5 ft. 2 in. and they are most effective between the ages of five and fourteen.

A mule which fulfils these conditions ought to be able to carry a load of 3 to nearly 4 cwt. without much food for a march of 10 to 12 hours, but it should not be taxed to its full limit.

The author estimates the number of mules required for a battery at about 12 per gun.

Personnel.

The men should be fairly tall, robust and sound in wind and limb. The minimum regulation height in Spain is 5ft. 7·3 in. They should be recruited in mountainous districts.

On a war footing 33 men per gun of all ranks.

Organization.

The author prefers regiments of Mountain Artillery to groups of batteries, it being more economical and advantageous from the point of view of efficiency.

The number of guns per battery may be four or six; he does not see much to choose between these numbers, as with this arm the sections are frequently detached and the section may be preferred as the tactical unit to the battery.

Instruction.

The practice should not be assimilated too closely to that of Field Artillery. Mountain Artillery should constantly practice firing against vanishing and moving targets, with frequent change of target and projectile. Mountain Artillery is liable to surprises and to be attacked at close quarters in places where its flank cannot be properly protected.

It must study to judge distances under different conditions of atmosphere, hour of the day and position the battery occupies, also the influence which altitude has on the range of the projectile and on the graduation of time fuzes, also on the best means for correcting the shooting in view of the great number of doubtful observations which they must take. Shrapnel fire also, under the peculiar conditions under which Mountain Artillery has to work, must be carefully studied and constant practice is necessary to ensure rapidity in getting the battery into action in difficult ground, both by hand and by the mules.

Frequent marching is necessary as a means of instruction to acquaint the officers and men with the care of animals and loads under all sorts of conditions, and these marches should not be undertaken by the battery alone, but in conjunction with other troops and at manœuvres.

In the second chapter the author gives the composition of the units of Mountain Artillery in Spain.

A regiment is composed of four batteries of six guns in peace and of six batteries and an ammunition column on a war footing.

Full details are given of the establishment of the batteries.

A regiment has a full colonel, a lieut.-colonel, 3 majors, 3 captains as adjutant, paymaster and quarter-master respectively, 1 lieut., 1 chaplain, 1 surgeon, 1 riding-master, 2 veterinary surgeons, 1 sergeant-trumpeter, 1 corporal-trumpeter, and 1 corporal of scouts.

The battery is divided into two parts, one being the *first or fighting line*, formed of the guns, each with two loads of ammunition, the loads of spare parts, stores and shoes, also four mules with pack-saddles. *The second line* is called the battery ammunition column, which composes the remainder of the ammunition loads (three per piece), iron work, material for pack-saddles, veterinary chests, provisions, baggage and spare animals.

The 6-gun battery is divided into two sections of three guns each. This will probably be changed into three sections of two guns each.

Battery on War Footing.

	Batteries		
	of 6 guns with		of 4 guns.
	2 Sections	3 Sections	
Captains	1	1	1
Lieutenants	4	5	4
Sergeants	6	6	6
Corporals	17	17	13
Trumpeters	3	3	2
Boys	1	1	1
First gunners	10	10	8
Second „	154	158	110
Artificers—for pack-saddles	1	1	1
„ — „ farrier	1	1	1
Saddle artificers	2	3	2
Blacksmiths	2	3	2
Shoeing-smiths	1	1	1
Total	198	204	147

ANIMALS.

	Batteries		
	of 6 guns with		of 4 guns
	2 Sections	3 Sections	
Officers horses	5	6	5
Troop ,, ...	10	10	8
Pack mules	70	72	51

The battery also carries its own medical and veterinary stores, clothing and necessaries, material for repairs, etc., etc., and is very complete.

All the stores of every kind as carried by the Mountain Artillery are given in the tables in the book to the very smallest detail.

Ammunition.

A 6-gun battery in 3 sections carries 144 segment shells, 180 shrapnel, 36 case, 360 cartridges, 36 empty cartridge bags, 450 friction tubes, 158 percussion and 180 time fuzes.

Other chapters treat of the care of material and the hygiene of *personnel* and animals, a most important item. The question of grooming, feeding and watering, also shoeing of the mules is treated of and many valuable hints, which the author has gained from long experience, are given.

The last chapter treats of special points which the captain of a battery has to bear in mind and these are classed under 3 heads.

(1) To keep every item in his equipment in a perfect state of readiness for immediate service.

(2) To keep his animals sound and fit; they should be ready at any moment to start in a campaign.

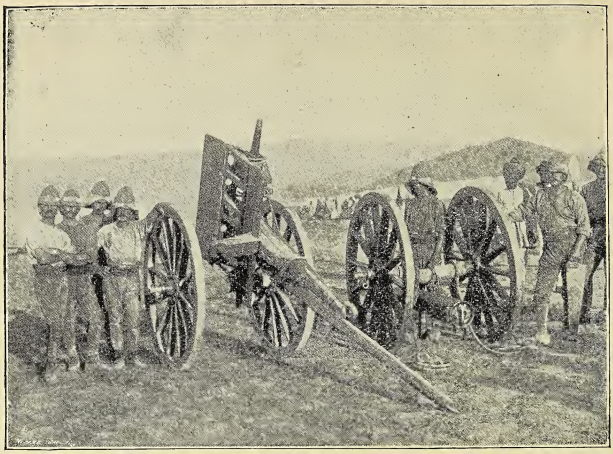
(3). To pay the greatest attention to the hygiene of his men, so that they may always be ready and capable of enduring fatigue without suffering in health.

The precautions necessary before starting on a march are then dealt with at some length and the author's remarks are all valuable, also are those on the subjects for rapidity of marching and duties in action.

The book ends with an appendix in which is given the results of the experiments made in 1894 in various patterns of pack-saddles and the conclusions arrived at by the committee.

Though a work of this kind may contain nothing which is absolutely new, and officers may be inclined to say that it is merely a collection of truisms which are the basis of every book of instruction or of regulations for Mountain Artillery, still then, truisms cannot be too frequently impressed on everyone who has to do with this important branch of artillery work. Moreover, if a book like this is perused by those who are interested in the details of Mountain Artillery, they are bound to find food for reflection when they compare the details of a Spanish battery with those of their own and it is quite possible that out of the experience of a man like the author of this work who has devoted the best part of his life to Mountain Artillery and who may be justly looked on as a specialist for that service, the reader may glean several practical and useful hints which may be of good service to him. The title of the book is—

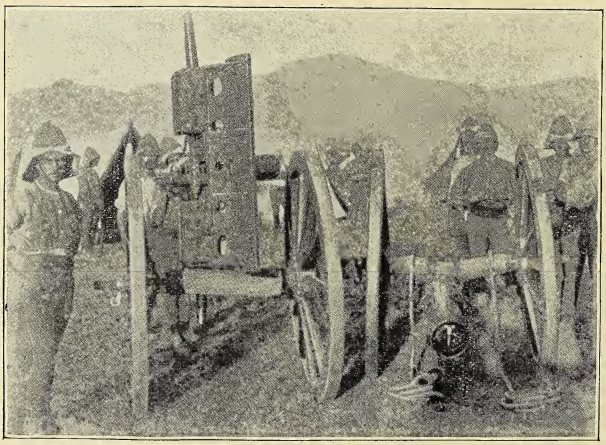
"Apuntes sobre la Artillería de Montaña," por el Coronel D. Manuel Salazar Barcelona, Imprenta Militar, Ancha, 58. and its cost is very trifling.



The O.C. 10th F.B. R.A., writes from Camp Matashah, Salarzai Valley, with Malakand Field Force, 20th Oct., 1897 :—I enclose two prints which will explain a device adopted by my battery for, if necessary, crossing guns over a weak bridge of narrow track. A couple of old tree trunks were cut down at Uch camp near Chakdara Fort, and three rough axles made so as to give a track of 4 feet only. The gun wheels fit on to these wooden axle-trees—the gun is slung under one of them—and the gun carriage and limber frame are up-ended and their proper axle-tree arms let down through a hole cut on one side of centre of the wooden axle. By this device, using five men only for draught, I took a gun across the Panjkora bridge. The concentrated load put on the bridge at one time was

5 men, say 7 cwt.	18 cwt.
Gun, say 7 cwt.	
2 wheels, say 4 cwt.	

The load with the limber frame is only 14 cwt. and with the wagon body much the same. I send this as it may be of interest as a means of crossing a short, narrow and weak bridge or piece of causeway under stress of circumstances.



NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

The Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows:—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings;' other things being of equal brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*) and (*e*) set in the five examinations ending November 1895:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

MAJOR R. H. MURDOCH, R.A., Assistant Superintendent, R.A. Records, is engaged on the "Memoirs Historical and Biographical" of the family of Desaguliers; he will be much obliged if anyone can give him information as to the representatives of this family at the present day.

List of additions to the Library during the month of November, 1897.

PRESENTED.	BY WHOM.
Examination Papers (A. to O.) of Volunteer Artillery, Nov. 1897.	D.G. of M.E.
General Report on the Practice carried out by the Royal Artillery in India during the season 1896–97. (4 copies).	I.G. of Artillery in India.
The Annual Statistical and General Report of the Army Veterinary Department for the year ending 31st March, 1897. ...	Secretary of State.
Stray Military Papers. By Lt.-Col. H. W. L. Hime, late R.A....	The Author.
Notes on Mechanism, as applied to Artillery. By Capt. S. B. von Donop, R.A.	The Author.

MUSEUM.

Full Dress Tunic with aiguillettes of an A.-D.-C. to the Queen, 1897. ... ... } Major-General R. McG. Stewart, C.B.

Model of a Japanese boat (Sampan) .. ... Captain N. W. H. Du Boulay, R.A.

R.L. shot, armour piercing 6-in.; after perforating 9-in. water hardened steel plate and 3 feet oak, 25.9.96. ... ... } Ordnance Committee.

PURCHASED.

Pierre Le Grand. L'Education, L'Homme, L'Œuvre; d'aprés des documents rouveaux. 3rd edition.

Album Militaire. Part 12, 2nd series.

Solutions de Questions de Tactique d'Infanterie et de Cavalerie. Suives de l'étude raisonnée des campagnes de 1806 et de 1814.

Rapport sur L'Expédition de Madagascar adressé le 25th Avril, 1896, au Ministre de la Guerre, suivi de tous les documents Militaires diplomatiques et parlementaires relatifs a l'expédition de 1895, with atlas.

Moltke's Militarische Korrespondenz, aus den dienstschilften des krieges 1870–71.

"Mars." By Percival Lowell. Second edition, 1896.

The Grammar of Lithography. Richmond.

La migration des Oiseaux. By A. de Brevans.

Artilleryman's Instruction.

A Treatise on the defence of Portugal, and principal events of the campaigns under Lord Wellington. By William Granville Eliot, Capt. R.A., 1811.

Memoir of Captain Dalton, H.E.I.C.S., defender of Trichinopoly, 1752–3. By Charles Dalton, F.R.G.S.

History of the rise and progress of the Bengal Army. By Captain Arthur Broome, Bengal Artillery. Vol. I., 1850.

Kriegsgeschichtliche Beispiele aus dem Deutsch-frangösischen kriege von 1870–1. Parts 4 and 5.

Biologia Centrali-Americana. Archæology. Part IX. Text and plates.

The war in the Peninsular; a continuation of the recollections of the eventful life of a soldier, 1825.

Stratégie de marche. Par le Général Lewal.

Die Heere und Slotten der gegenwart. Part II., Great Britain and Ireland.

An impartial history of the present war in America, containing an account of its rise and progress, etc. By the Rev. James Murray, 1778. 2 vols.

A practical treatise on modern gas and oil engines. By Frederick Grover.

Ein Sommernachtstraum, Berlin, 1888.

Etudes de Guerre, tactigues des renseigmments. Par Le Général Lewal. 2 vols, Paris 1881 and 1883.

BOOKS RECOMMENDED FOR THE PROMOTION AND STAFF COLLEGE EXAMINATIONS.

BY

LIEUT.-COLONEL EDEN BAKER, R.A.

(*Always closely follow the Syllabus in the Queen's Regulations*).

MILITARY LAW.

LIEUTENANTS.—Army Annual Act, 1897.
Manual of Military Law, 1894.—Army Act; Parts I., II. and V.; Sections 175 to 184, and 190; Rules of Procedure.
Queen's Regulations.—Sections VI., XIX. and XXII.
Military Law. By Lieut.-Colonel S. C. Pratt. 11th Edition 1896.
Military Law Examiner. By Lieut.-Colonel S. C. Pratt, 1897.

CAPTAINS, in addition to the above:—
Manual of Military Law, 1894.—Army Act; Parts III., IV. and V.; Sections 185 to 189, and Schedules.

MILITARY ENGINEERING.

ALL RANKS.—Manual of Military Engineering, 1893. *Omit* Sections VII., XII., XIII., XVI., XVII., XIX., 16-18, 22-25, XX.

For Staff College, in addition:—
Instruction in Military Engineering; Part I. Field Defences, 1894 (*omit* fougasses and large inundations).
Field Works. By Colonel C. B. Brackenbury, R.A.
Field Artillery Service Hand-book, 1897; pages 123-127, 209-211, 238-240, 259-260, 264, 265, 292-321.

MILITARY TOPOGRAPHY.

Text-book of Military Topography.

TACTICS.

Infantry Drill, 1896.
Field Artillery Drill, 1896.
Cavalry Drill; Vol. II, 1896.
} The tactical portions only

For Staff College, in addition:—
Précis of Modern Tactics. By Col. R. Home; revised by Lt.-Colonel S. C. Pratt, 1896.
Field Artillery. By Lt.-Col. S. C. Pratt,; revised by Lt.-Col.-E. Baker, 1896 (the tactical portion only).
Minor Tactics. By Col. Clery; 12th Edition.

ARTILLERY.

For Lieutenants R.A. only) :—

Text-book of Gunnery, 1897; Chapters I., II., IV., V., VI., IX., X., XI., XII., XIII.
Treatise on Service Ordnance, 1893.
Treatise on Military Carriages, 1895.
Treatise on Ammunition, 1897.
Regulations for Magazines, etc., 1894. Also see Amendments published with A.O., 20th January, 1896.
Field Artillery Service Hand-book, 1897.
Field Artillery Drill, 1896. For Horse and Field Batteries only.
Garrison Artillery Drill; Vol. I., 1895; Vol. II., 1897. } For Garrison Artillery only.
Siege Artillery Drill, 1896. } For Garrison Artillery only.

ARTILLERY—VOLUNTEER OFFICERS.

Official Hand-books of guns on which examined.
Field Artillery Drill, 1896.
Garrison Artillery Drill; Vol. I., 1895; Vol. II., 1897.
Hand-book of Artillery *Matériel.* By Lt.-Col. Morgan.
Volunteer Regulations; Appendix IX.

MILITARY ADMINISTRATION.

The Army Book for the British Empire.
Field Army Establishments, Home Defence, 1892; Section I.
Field Army Establishments, Service Abroad, 1892. Section I.
Notes on Military Law, Organization, etc. By Capt. Morrison, 1897; Chapter VI.

Officers going up for the Staff College Examinations are recommended to read all Magazine Articles, Lectures, etc., that refer to Field Subjects.

WOOLWICH, 17th NOVEMBER, 1897.

Obituary.

General W. D. Aitken, Colonel-Commandant, died at Brighton on 18th November, 1897. He joined the Bombay Artillery as 2nd Lieutenant, 11th June, 1840; became Lieutenant, 27th June, 1842; Captain, 25th June, 1852; Brevet Major, 20th July, 1858; Lieut.-Colonel, 18th February, 1861; Colonel, 3rd August, 1865; Major-General, 28th October, 1868; Lieut.-General, 1st October, 1877; General, 31st March, 1883, and Colonel-Commandant, 27th November, 1885. General Aitken served in the Persian Expedition, 1856–7, and was present at the bombardment of Mohumrah (despatches, medal with clasp); Indian Mutiny, 1857–8, campaign in Rajpootana and Central India, actions at Rewah, sieges of Awah and Kotah, and subsequent operations (despatches, medal with clasp, Brevet of Major).

Captain F. R. McC. de Butts, who was killed in action at the Sampagha Pass, N.W. Frontier, on 29th October, 1897, was commissioned as Lieutenant, 25th July, 1882, and became Captain, 20th June, 1891. Captain de Butts served in the Burmese Expedition, 1886–7 (medal with clasp).

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